MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The REVIEW for April, 1896, is based on 2,726 reports from stations occupied by regular and voluntary observers, classified as follows: 149 from Weather Bureau stations; 33 from U. S. Army post surgeons; 2,404 from voluntary observers; 32 from Canadian stations; 1 from Hawaii; 96 received through the Southern Pacific Railway Company; 11 from U. S. Life-Saving stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

The WEATHER REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the statistical tables are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data. Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada, Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu, and of Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

East of the Rocky Mountain Plateau regions the mean temperatures during April were generally above the normal; very many stations report the highest maximum temperatures on record.

A region of heavy rainfall covered the upper Mississippi and lower Missouri valleys. The rainfall was below the normal in the Atlantic and Gulf States and in the Ohio Valley.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The *mean pressures* during the current month were high in the Middle and South Atlantic States, Florida, and the Ohio Valley. The highest were: Charleston, 30.22; Savannah, 30.21; Jacksonville, 30.20; Mobile, 30.19.

The *mean pressures* were low in the Missouri Valley, the northern and middle slopes, the southern Plateau, and British Columbia. The lowest were: Dodge City, 29.83; Spences Bridge, 29.84; Calgary and Pueblo, 29.85; Concordia, 29.86; Medicine Hat, 29.87; Omaha and Wichita, 29.88.

As compared with the normal for April, the mean pressure was in excess over New England, the Middle and South Atlantic States, the Lake Region, and Quebec and Ontario, but generally deficient west of the Mississippi River. The greatest excesses were: Boston, Wilmington, and Charleston, 0.19; Father Point, Eastport, Block Island, New Haven, Kittyhawk, Hatteras, and Savannah, 0.18; Washington, 0.17. The greatest deficits were: Concordia, 0.17; Rapid City, 0.12; Pueblo, 0.11; Pierre, 0.10.

As compared with the preceding month of March the pressures reduced to sea level show a decided rise over New England, the Middle and South Atlantic States and Lake Region and a decided fall west of the Mississippi River. The greatest rises were: Chatham, 0.25; Father Point and Eastport, 0.24; Charlottetown and Yarmouth, 0.23; Portland, Me., 0.22. The greatest falls were: Concordia, 0.24; North Platte and Dodge City, 0.23; Pierre, 0.22; Huron, 0.21; Omaha and Pueblo, 0.20.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During the month of April nine low areas have been traced on Chart I, and six high areas on Chart II. These charts show also the position of each low and high at each 12-hour period of its existence and the barometer reading at these points. During the last few days of the month an area of rather permanent high pressure remained nearly stationary off the south Atlantic Coast, but not sufficiently near our stations of observation to be charted. A remarkable feature of the lows this month has been their formation on the Pacific Coast in the extreme northwest and their general disappearance before reaching the Atlantic Coast. There has also been a marked absence of storms passing over the Southern States.

The accompanying table exhibits some of the more important facts regarding the origin and velocity of the highs and lows, and the following brief description is added:

HIGH AREAS.

I.—First seen in Wyoming a. m. of 1st; its motion was east-southeast, and was last seen p. m. of 5th off the south Atlantic Coast.

II.—First observed in Washington State p. m. of 3d; its motion was eastward, reaching the Atlantic Coast a. m. of 9th. After that it hovered off the coast and its last definite location was off the south Atlantic Coast p. m. of 11th.

III.—First seen to the north of Montana a. m. of 15th; its motion was to the north of stations of observation, and it disappeared in Manitoba p. m. of 17th.

IV.—First noted to the north of Montana a. m. of 20th; its motion was southeast, and it was last noted off the middle Atlantic Coast p. m. of 23d.

V.—This high was seen first to the north of Lake Superior a. m. of 23d; its motion was the slowest of any high during the month, and this slow motion was partly made up from its hovering near Nova Scotia for three days. It was last noted a. m. of 28th off Nova Scotia.

VI.—Like the last, this high was first seen to the north of Lake Superior a. m. of 28th. It moved east to the north of the St. Lawrence, which it reached p. m. of 30th.

LOW AREAS.

I.—This is the continuation of No. X of March, which was in Iowa p. m. of 31st, and first noted in Wisconsin; its motion was eastward, and it was last seen in the St. Lawrence Valley p. m. of 2d.

II.—First noted p. m. of 1st in eastern Virginia; its motion was northeast, and it disappeared off Nova Scotia p. m. of 5th.

III.—Was first seen off the north Pacific Coast a. m. of 6th; its motion was first southeast, reaching Kansas 7th; thence its track was northeast, being last noted over Lake Huron p. m. of 9th.

IV.—Was first seen off the middle Pacific Coast a. m. of 9th; its motion was a little south of east to Kansas and then northeast. It was last noted north of Lake Superior a. m. of 14th.

V.—First noted to the north of Montana p. m. of 11th; its motion was southeast to Nebraska, thence northeast to the north of Lake Huron, where it was last seen a. m. of 16th.

VI.—This storm was first seen in New Mexico a. m. of 16th; it moved north-northeast, and disappeared in Manitoba p. m. of 19th.

VII.—This storm also originated off the north Pacific coast p. m. of 18th; its motion was nearly due east, and it was last seen off the New England Coast a. m. of 22d. This storm and No. II are the only ones of the month reaching the Atlantic.

VIII.—First noted to the north of Montana p. m. of 20th; its motion was eastward, at the lowest velocity of any storm of the month. It was last seen to the north of Lake Superior p. m. of 24th.

IX.—First seen off the middle Pacific Coast p. m. 23d; its motion was erratic, as it doubled on itself. It was last noted p. m. of 30th in northern Minnesota.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	43	111	5, p. m.	32	79	3,070	4.5	681	29.2
II	3, p. m.	48	118	11, p. m.	32	78	4,180	8.0	522	21.8
III	15, a. m.	54	117	17, p. m.	52	105	980	2.5	396	16.5
IV	20, a. m.	52	111	23, a. m.	34	76	2,370	3.5	677	28.2
V	23, a. m.	50	85	28, a. m.	43	64	1,850	5.0	371	15.5
VI	28, a. m.	48	85	30, p. m.	49	66	970	2.5	389	16.2
Sums							13,430	26.0	3,036	127.4
Mean of 6 paths							2,238	4.33	506	21.2
Mean of 26 days									517	21.5
Low areas.										
I	1, a. m.	46	89	2, p. m.	48	75	680	1.5	456	19.0
II	1, p. m.	37	77	5, p. m.	46	57	1,610	4.0	403	16.8
III	6, a. m.	48	127	9, p. m.	43	84	3,030	3.5	867	36.1
IV	9, a. m.	43	124	14, a. m.	50	87	2,530	5.0	506	21.1
V	11, p. m.	52	116	16, a. m.	47	83	2,360	4.5	508	21.0
VI	16, a. m.	32	109	19, p. m.	51	95	1,870	3.5	535	22.3
VII	18, p. m.	47	124	22, a. m.	41	69	3,200	3.5	915	38.1
VIII	20, p. m.	53	116	24, p. m.	51	86	1,600	4.0	401	16.7
IX	23, p. m.	42	126	30, p. m.	48	97	3,550	7.0	507	21.5
Sums							20,330	36.5	5,098	212.6
Mean of 9 paths							2,259	4.6	566	23.6
Mean of 36.5 days									557	23.2

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

2d.—Severe winds were experienced throughout portions of Wisconsin, Michigan, and northern Indiana. In some cases the wind was accompanied by heavy snow and freezing temperatures. Railway train service was much impeded in northern Wisconsin and Michigan.

10th.—Severe winds visited portions of Wapello and Jefferson counties, Iowa, on the morning of the 10th. The damage was confined to barns and outbuildings.

11–12th.—High winds with rain, snow, or sleet prevailed throughout eastern Colorado and western Kansas from near midnight of the 11th until late in the afternoon of the 12th. The area of storm winds also extended southward to northern-central Texas. Traffic was generally suspended on all railway lines in Colorado and there was also more or less minor damage to telegraph and telephone wires, electric light plants, etc. The damage in Texas was mostly caused by high winds. The points at which small losses occurred were Fort Worth, Cresson, Reagin, Annetta, Abilene, and Colorado City. At the last-named place the storm assumed the violence of a tornado (see March REVIEW, p. 82). A tornado also occurred in the vicinity of Cale, Ind. T.; damage small.

13th.—Severe local winds were felt at Burlington and Clinton, Vt., but no serious damage was done.

15th.—Severe thunderstorms, at times approaching the violence of a tornado, occurred in Faulk and Edmund counties, S. Dak., during the early morning of this date.

19th.—A destructive hailstorm visited the towns of New Marlboro, Sandisfield, and Tolland, Mass., destroying many panes of glass and damaging the interiors of a number of residences at those places.

20th.—A tornado occurred on the afternoon of this date near Fremont, Sandusky County, Ohio, and many destructive thunderstorms were experienced in other portions of northern Ohio, Indiana, and Pennsylvania. The path of greatest severity extended from the Indiana line across the State of Ohio and into the northwestern portion of Pennsylvania. Roofs and chimneys were damaged by the high winds; crops and fences were blown down; cellars flooded and considerable loss was entailed upon electric light companies by the blowing down of their wires and poles. Damages by severe thunderstorms were also reported from various points in Nebraska, Iowa, Illinois, and Indiana.

22d.—Severe wind and hailstorms passed over small portions of Nevada, Vernon, and Stoddard counties, Mo., on this date. The damage was confined to fruit trees and crops.

24th.—Two houses were demolished by a severe windstorm at Salem, Va.

25th.—The most severe storm of the month, measured by the number of lives lost and the value of property destroyed, occurred shortly after 7 o'clock of this date. The storm was first observed near the little town of St. Joseph, in the eastern part of Cloud County, Kans., thence it passed in a northeasterly direction through the northern part of Clay County, and into the southern edge of Washington County. Its path was about 400 feet wide and 20 miles long; 8 people were killed and about 20 injured; loss about $15,000.

26th.—A severe wind and hail storm passed over parts of Conway and Faulkner counties, Ark., blowing down some timber and fences and a few houses.

The following is from the report of the North Dakota Climate and Crop Service, April, 1896:

A severe cyclone [tornado] occurred at 5 o'clock p. m., Sunday, April 26, in the western portion of Barnes County, the most destruction to property occurring near Hobart, and one person was injured at that place. The tornado formed near the foot of Lake Eckelson and moved in a zig-zag course in a northeasterly direction, barns and a schoolhouse in its path being wrecked and all of the buildings belonging to Nels Monson, a farmer, were destroyed. Monson was carried away

with the house and was afterward found in an unconscious condition, lying in a slough, about fifty yards from where the house had stood. His injuries consisted of bruises and a broken arm, but were nor fatal. The storm extended about 20 miles in length and was only about 40 rods in width.

27th.—Two tornadoes occurred in Hanson and McCook counties, S. Dak.; 2 persons were injured and the property loss was about $15,000.

28th.—The following is from the report of the Iowa Climate and Crop Service, April 1896:

On the night of the 28th a severe windstorm, having some of the characteristics of a tornado, passed through Poweshiek County, Iowa, in a northeasterly direction, the line of greatest force being about 4 miles east of Grinnell. One house, belonging to Mr. C. Ingerman, was turned on its foundation and badly wrecked. A number of other buildings were unroofed or badly damaged, and the general destruction of property was considerable, but happily no person was seriously injured. The storm appears to have been a heavy squall, with occasional gyratory movement of the wind. It was probably the nearest approach to a tornado that was noted within the State during that month of frequent storms.

A destructive windstorm was reported as having occurred in the vicinity of Centralia, Mo., but inquiry fails to elicit any of the details.

High winds and unusually heavy rains were also reported from points in northeastern Iowa, western Kansas, eastern Colorado, Nebraska, South Dakota, Minnesota, and Wisconsin.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table II, for voluntary observers. Both the mean temperatures and the departures from the normal are given in Table I for the regular stations of the Weather Bureau.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau Region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean temperatures* were: Key West, 75.0; Jupiter, 72.0; Tampa, 71.2; Corpus Christi, 70.8; Montgomery, 70.2.

The *lowest mean temperatures* were: In the United States: Duluth, 38.1; Havre, Helena, and Lander, 39.4; Eastport, 39.6; Sault Ste. Marie, 40.0. In Canada: St. Johns, N. F., 32.0; Minnedosa, 32.4; Prince Albert, 32.6.

As compared with the normal for April the mean temperatures for the current month were above the normal in all regions except the northern Slope, the southern, middle, and northern plateaus, and the Pacific Coast. The greatest excesses were: Lexington and Cleveland, 8.5; Port Stanley, 8.2; St. Louis, 8.1; Saugeen and Port Huron, 8.0. The greatest deficits were: Redbluff, 8.3; Fresno, 7.3; Winnemucca, 7.2; Edmonton, 6.6; Walla Walla and Carson City, 6.3; Portland, Me., Roseburg, and Sacramento, 6.2.

Considered by districts the mean temperatures for the current month show departures from the normal as given in Table I. The greatest positive departures were: Middle Slope, 16.5; Missouri Valley, 14.6. The greatest negative departures were: Florida Peninsula, 9.7; east Gulf, 4.8.

The *years of highest and lowest mean temperatures* for April are shown in Table I of the REVIEW for April, 1894. The mean temperature for the current month was the highest on record at: Harrisburg, 54.4; Pittsburg, 57.2; Cleveland, 53.4; Columbus, 58.6; Parkersburg, 59.7; Cincinnati, 61.6; Indianapolis, 60.0; Chicago, 53.4; Greenbay, 47.7; Dubuque, 55.0; Davenport, 57.1; Springfield, Ill., and Keokuk, 60.0; Des Moines, 56.0; Concordia, 61.0; Topeka, 62.8; Dodge City, 59.9; Wichita, 63.7; Kansas City, 61.4; Columbia, Mo., 63.6; Springfield, Mo., 62.8; St. Louis, 64.8; Cairo, 65.8; Louisville, 64.6; Lexington, 61.8; Raleigh, 63.6; Charlotte, 64.8; Knoxville, 63.8; Chattanooga, 65.0; Nashville, 65.1; Meridian, 69.0; Fort Smith, 68.0; Little Rock, 68.4; Vicksburg, 70.4; Montgomery, 70.2; Atlanta, 65.7. It was the lowest on record at: Neahbay, 44.8; Roseburg, 46.3; Redbluff, 52.2; Winnemucca, 40.6; Carson City, 42.6; Sacramento, 53.3; San Francisco, 51.6; Fresno, 54.7; Los Angeles, 56.2; Yuma, 65.8.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: 96, Cape Henry (19th), Columbia, S. C. (18th); 95, Lynchburg, Norfolk, and Raleigh (18th); 94, Baltimore (18th), Charlotte (17th); 93, Philadelphia, Washington, Parkersburg (18th), Augusta (17th). The lowest maxima were: 59, Port Angeles (20th); 60, Duluth (19th), Tatoosh Island (24th); 61, Fort Canby (4th); 62, Neahbay (24th), Eureka (4th). The highest minima were: 66, Key West (3d); 53, Port Eads (frequently), Corpus Christi (2d); 51, Jupiter (14th). The lowest minima were: 5, Lander (1st); 6, Helena (16th), Havre (17th); 8, Cheyenne (1st); 9, Denver (2d); 10, Williston (16th).

The *years of highest maximum and lowest minimum temperatures* are given in the last four columns of Table I of the current REVIEW. During the present month the maximum temperatures were the highest on record at: Northfield, 81; Albany, 88; New Haven, 85; Block Island, 71; Nantucket, 70; Woods Hole, 69; Vineyard Haven, 79; New York, 90; Philadelphia, 93; Harrisburgh, 92; Pittsburg, 90; Columbus, Ohio, 89; Sandusky, 88; Toledo, 86; Detroit, 85; Port Huron, 84; Greenbay, 84; Milwaukee, 85; Toledo, 86, Indianapolis, 87; Cincinnati, 87; Parkersburg, 93; Baltimore, 94; Washington, 93; Cape Henry, 96; Norfolk, 95; Lynchburg, 95; Lexington, 88; Knoxville, 90; Chattanooga, 90; Atlanta, 89; Charlotte, 94; Raleigh, 95; Columbia, S. C., 96; Savannah, 90; Jacksonville, 92. The minimum temperatures were the lowest on record at: Harrisburg, 24; Greenbay, 11; Minneapolis, 15; Havre and Helena, 6; Neahbay, 27; Fort Canby, 34; Astoria, 32; Idaho Falls, 13; Salt Lake City, 18; Redbluff, 34; Sacramento, 36; Fresno, 34; Los Angeles, 38; Pueblo, 15; Amarillo, 24; Columbia, Mo., 21.

The greatest daily range of temperature and the extreme monthly ranges are given for each of the regular Weather Bureau stations in Table I, which also gives data from which may be computed the extreme monthly ranges for each station. The largest values of the greatest daily ranges were: Pueblo, 47; Northfield and Dodge City, 46; Elpaso, 45; Portland, Me., and Sandusky, 44. The smallest values were: Port Eads, 10; Key West, 12; Galveston, 16; Corpus Christi and Tatoosh Island, 17; San Francisco, 18; Hatteras, 19; Jupiter and New Orleans, 20. Among the extreme monthly ranges the largest values were: Dodge City, 76; Greenbay, 73; Milwaukee and Denver, 71; Concordia, 70. The smallest values were: Key West, 17; San Francisco, 25; Point Reyes Light, 26; Tatoosh Island, Fort Canby, and Eureka, 27.

The *accumulated monthly departures* from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	°	°		°	°
West Gulf	+ 2.8	+ 0.7	New England	— 3.7	— 0.9
Ohio Valley and Tenn.	+ 2.0	+ 0.5	Middle Atlantic	— 2.0	— 0.5
Lower Lake	+ 2.0	+ 0.5	South Atlantic	— 2.2	— 0.6
Upper Lake	+ 9.8	+ 2.4	Florida Peninsula	— 9.7	— 2.4
North Dakota	+ 6.0	+ 1.5	East Gulf	— 4.8	— 1.2
Upper Mississippi	+12.7	+ 3.2			
Missouri Valley	+14.6	+ 3.6			
Northern Slope	+ 8.9	+ 2.2			
Middle Slope	+16.5	+ 4.1			
Abilene (southern Slope)	+10.0	+ 2.5			
Southern Plateau	+ 3.8	+ 1.0			
Middle Plateau	+ 4.9	+ 1.2			
Northern Plateau	+17.4	+ 4.4			
North Pacific	+ 0.9	+ 0.2			
Middle Pacific	+ 2.2	+ 0.6			
Southern Pacific	+ 4.5	+ 1.1			

The limit of freezing weather is shown on Chart VI by the isotherm of minimum 32°, and the limit of frost by the isotherm of minimum 40°.

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-points for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, are given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer, but a properly constructed evaporometer may be made to give the *quantity* of water evaporated from a similar surface during any interval of time. Such an evaporometer, therefore, would sum up or integrate the effects of those influences that determine the temperature as given by the wet bulb; from this quantity the *average humidity of the air* during any given interval of time may be deduced.

Measurements of evaporation within the thermometer shelters are difficult to make so as to be comparable at temperatures above and below freezing, and may be replaced by computations based on the wet-bulb temperatures. The absolute amount of evaporation from natural surfaces not protected from wind, rain, sunshine, and radiation, are being made at a few experimental stations and will be discussed in special contributions.

Sensible temperatures.—The sensation of temperature experienced by the human body and ordinarily attributed to the condition of the atmosphere depends not merely on the temperature of the air, but also on its dryness, on the velocity of the wind, and on the suddenness of atmospheric changes, all combined with the physiological condition of the observer. A complete expression for the relation between atmospheric conditions and nervous sensations has not yet been obtained.

PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month was heaviest (from 6 to 18 inches) in the coastal and mountainous regions of northern California, Washington, and Oregon. Areas of 8 to 10 inches were reported from eastern Nebraska, inclosed within a much larger region of over 6 inches.

The larger values at regular stations were: Eureka, 11.1; Astoria, 9.2; Neahbay, 7.9; Greenbay, 7.5.

The *diurnal variation*, as shown by tables of hourly means of the total precipitation, deduced from self-registering gauges kept at the regular stations of the Weather Bureau, is not now tabulated.

The *current departures* from the normal precipitation are given in Table I, which shows that precipitation was in excess over the upper Lake Region, upper Mississippi, and lower Missouri valleys, Manitoba, Washington, Oregon, and northern California. It was deficient in the Atlantic States. The large excesses were: Eureka, 7.0; Dubuque, 5.0; Winnipeg, 4.3; Dodge City, 3.9; La Crosse, 3.6; Greenbay and Astoria, 3.3. The large deficits were: Fort Smith, 4.6; Louisville, 4.2; Vicksburg, 3.6; Palestine, 3.4; Atlanta, 3.1; Nantucket and Hatteras, 3.0.

The *average departure* for each district is also given in Table I. By dividing these by the respective normals the following corresponding percentages are obtained (precipitation is in excess when the percentages of the normals exceed 100):

Above the normal: Lower Lake, 109; upper Lake, 147; North Dakota, 160; upper Mississippi, 130; Missouri Valley, 138; northern Slope, 106; middle Slope, 109; middle Plateau, 145; northern Plateau, 120; north Pacific, 127; middle Pacific, 236.

Normal: Southern Plateau, 100.

Below the normal: New England, 38; middle Atlantic, 37; south Atlantic, 42; Florida Peninsula, 46; east Gulf, 61; west Gulf, 56; Ohio Valley and Tennessee, 57; southern Plateau, (Abilene), 41; southern Pacific, 92.

The years of greatest and least precipitation for April are given in the REVIEW for April, 1890. The precipitation for the current month was the greatest on record at: Williston, 2.86; St. Paul, 5.63; Greenbay, 5.48; La Crosse, 5.84; Minneapolis, 5.12; Huron, 6.17; Sioux City, 6.16; Dubuque, 7.80; Topeka, 4.00; Dodge City, 5.50; Winnemucca, 1.95; Eureka, 11.13; Point Reyes Light, 4.20; Fresno, 2.82. It was the least on record at: Eastport, 0.86; New Haven, 1.19; Nantucket, 0.62; Narragansett Pier, 1.38; Woods Hole, 1.33; Harrisburg, 1.19; Washington, 1.07; Cincinnati, 0.59; Indianapolis, 1.27; Louisville, 0.40; Lexington, 0.40; Wilmington, 0.64; Atlanta, 0.58; Fort Smith, 0.46.

The total accumulated monthly departures from normal precipitation from January 1 to the end of the current month are given in the second column of the following table; the third column gives the ratio of the current accumulated precipitation to its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	Inches.	*Per ct.*		*Inches.*	*Per ct.*
Lower Lakes	+ 1.00	109	New England	— 2.80	82
North Dakota	+ 2.30	157	Middle Atlantic	— 1.80	85
Northern Slope	+ 0.50	114	South Atlantic	— 3.70	77
Middle Plateau	— 0.90	116	Florida Peninsula	— 0.60	94
North Pacific	+ 4.40	130	East Gulf	— 4.00	80
Middle Pacific	+ 2.40	114	West Gulf	— 2.50	83
			Ohio Valley and Tenn.	— 5.80	68
			Upper Lakes	— 0.70	92
			Upper Mississippi	— 1.30	86
			Missouri Valley	— 0.50	93
			Middle Slope	— 1.50	73
			Abilene (southern Slope)	— 2.90	54
			Southern Plateau	— 0.40	79
			Northern Plateau	— 1.10	85
			South Pacific	— 1.60	79

Details as to *excessive precipitation* are given in Tables XII and XIII.

The *total monthly snowfall* at each station is given in Table II. Its geographical distribution is shown on Chart VI. The southern limit of freezing temperatures and possible snow is shown on this chart by the isotherm of minimum 32°. The isotherm of minimum 40°, namely, the air temperature within the thermometer shelter, is also given on this chart,

and shows approximately the southern limit of frost on exposed surfaces.

WIND.

The *prevailing winds* for April, 1896, viz, those that were recorded most frequently, are shown in Table I for the regular Weather Bureau stations.

The *resultant winds*, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table IX. These latter resultants are also shown graphically on Chart IV, where the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a uniform wind of average velocity. These figures indicate the relative extent to which winds from different directions counterbalanced each other.

HIGH WINDS.

Maximum wind velocities of 50 miles or more per hour were reported at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes; extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				*Miles*	
Abilene, Tex	12	60	sw.	Elpaso, Tex	12	64	sw.
Amarillo, Tex	10	60	s.	Do	27	50	sw.
Do	11	54	s.	Fort Canby, Wash	6	54	s.
Do	28	66	w.	Do	24	58	s.
Buffalo, N. Y	2	54	w.	Do	30	60	s.
Chicago, Ill	10	57	se	Huron, S. Dak	7	51	se.
Do	13	59	s.	Do	25	50	s.
Do	18	60	s.	Moorhead, Minn	28	51	se.
Cleveland, Ohio	2	56	w.	New York, N. Y	4	52	nw.
Do	3	54	w.	Pueblo, Colo	12	54	n.
Denver, Colo	30	50	nw.	Rapid City, S. D	28	58	n.
Dodge City, Kan	12	55	s.	Santa Fe, N. Mex	10	50	sw.
Do	17	54	s.	Sioux City, Iowa	26	50	nw.
Do	28	59	s.	Williston, N. Dak	19	52	w.
Duluth, Minn	1	52	nw.				

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 21, 26, 29. Arizona, 11, 17, 27. Arkansas, 7, 21, 22, 25, 26, 28, 29. California, 6, 9, 10, 13 to 16, 18, 19, 22, 24 to 30. Colorado, 17, 28, 30. Connecticut, 25. Florida, 25. Georgia, 24, 25, 27 Idaho, 6, 7, 8, 10, 12 to 16, 18, 19, 20, 22, 25, 27 to 30. Illinois, 7, 10, 13, 18, 20, 21, 23, 26, 28, 29. Indiana, 8, 20, 21, 24, 27. Iowa, 7, 9 to 13, 19, 20, 23, 25, 26, 28, 29. Kansas, 5 to 8, 10 to 13, 16 to 22, 24, 25, 26, 28, 30. Kentucky, 21, 23, 24, 26, 29. Louisiana, 13, 14. Maryland, 11. Massachusetts, 17, 19, 20. Michigan, 11, 17. Minnesota, 1, 11, 13, 16, 17, 23, 25 to 29. Mississippi, 26, 27, 29. Missouri, 7, 8, 9, 13, 17, 20, 21, 22, 24 to 30. Montana, 13. Nebraska, 5, 7 to 12, 16, 17, 20, 23, 25, 26, 28, 30. Nevada, 6, 15, 16, 17, 19 to 22, 25, 26, 28, 29. New Jersey, 2, 21. New York, 2, 4, 6, 17, 20, 21, 25. North Carolina, 8, 9, 17, 24, 25. North Dakota, 8, 11, 12, 26, 27. Ohio, 1, 11, 20, 21, 24, 27 to 30. Oklahoma, 8. Oregon, 5 to 10, 14, 15, 17, 18, 24, 25, 27 to 30. Pennsylvania, 17, 21. South Carolina, 24, 25. South Dakota, 11, 17, 23, 25, 27. Tennessee, 20, 21, 22, 24, 26, 27, 30. Texas, 1, 2, 3, 8, 11, 12, 13, 21, 22, 28, 30. Utah, 10, 11, 14, 27. Virginia, 9, 17, 24. Washington, 2, 6, 7, 8, 10 to 15, 18, 21, 25, 28, 29. West Virginia, 21, 24, 29, 30.. Wisconsin, 1, 10, 11, 13, 16, 17, 18, 20, 27, 28.

SLEET.

The following are the dates on which sleet fell in the respective States:

Arizona, 11, 27. California, 9, 11, 14, 15, 16. Colorado, 10 to 13, 16, 17, 26. Connecticut, 2. Idaho, 10, 11, 18. Illinois, 6 to 9. Indiana, 8. Iowa, 7, 8, 9. Kentucky, 8. Maine, 2, 7, 22. Maryland, 6, 9. Massachusetts, 2, 22. Michigan, 1, 9, 10, 22. Minnesota, 6, 7, 8, 11, 16, 17. Missouri, 8, 13. Montana, 30. Nebraska, 11, 12, 17. Nevada, 9, 10, 13, 15, 16, 17, 19, 22, 26, 27. New Hampshire, 2. New Jersey, 2, 7, 10. New York, 2. North Carolina, 9. North Dakota, 1, 7, 8, 11, 12, 13, 15, 16, 17. Ohio, 1, 8, 9. Oregon, 9, 12, 18, 24, 29, 30. Pennsylvania, 2 to 9. South Dakota, 6, 7, 10, 11, 17. Texas, 2, 3, 17. Utah, 14, 16, 17. Virginia, 9. Washington, 1, 2, 25. West Virginia, 9. Wisconsin, 1, 2, 7, 9.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 17 regular stations of the Weather Bureau by its photographic, and at 21 by its thermal effects. At one station records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric sheets show seventy-fifth meridian time; for convenience the results are all given in Table XI for each hour of local mean time.

Photographic and thermometric registers give the duration of that intensity of sunshine which suffices to make a record, and, therefore, they generally fail to record for a short time after sunrise and before sunset, because, even in a cloudless sky, the solar rays are then too feeble to affect the self-registers. If, therefore, such records are to be used for determining the amount of cloudiness, they must be supplemented by special observations of the sky near the sun at these times. The duration of clear sky thus specially determined constitutes the so-called twilight correction (more properly a low-sun correction), and when this has been applied, as has been done in preparing Table XI, there results a complete record of the clearness of the sky from sunrise to sunset in the neighborhood of the sun. The twilight correction is not needed when the self-registers are used for ascertaining the duration of a special intensity of sunshine, but is necessary when the duration of cloudiness is alone desired, as is usually the case.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table XI.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the duration relative to possible sunshine is derived; the observer's personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for April, 1896, is 5 per cent for photographic and 14 per cent for thermometric records. The details are shown in the following table, in which the stations are arranged according to the greatest possible duration of sunshine, and not according to the *observed* duration as heretofore.

Difference between instrumental and personal observations of sunshine.

Stations.	Apparatus.	Total possible duration for the whole month.	Personal estimated area of clear sky.	Instrumental record of sunshine.			
				Photographic.	Difference.	Thermometric.	Difference.
		Hrs.	%	%	%	%	%
Bismarck, N. Dak.	P.	408.4	38	42	+ 4	.....	.....
Helena, Mont.	P.	408.4	52	54	+ 2	.....	.....
Portland, Oreg.*	T.	407.0	37	.....	.....	30	− 7
	P.	407.0	37	30	− 7	.....	.....
Eastport, Me.	P.	405.2	44	54	+10	.....	.....
Northfield, Vt.	P.	404.6	45	54	+ 9	.....	.....
Portland, Me.	T.	403.6	40	.....	.....	59	+19
Rochester, N. Y.	T.	402.1	55	.....	.....	68	+13
Buffalo, N. Y.†	T.	402.1	37	.....	.....	51	+14
Boston, Mass.	T.	401.1	53	.....	.....	61	+ 7
Chicago, Ill.	P.	401.1	54	57	+14	63	+ 9
Cleveland, Ohio	T.	401.1	43	.....	.....	.....	.....
Des Moines, Iowa.	T.	401.1	39	.....	.....	65	+26
Detroit, Mich.	P.	401.1	52	38	+ 4	62	+10
Eureka, Cal.	T.	399.4	34	.....	.....	.....	.....
New York, N. Y.	P.	399.4	40	56	+28	57	+ 8
Salt Lake City, Utah.	T.	399.4	28	.....	.....	.....	.....
Colorado Springs, Colo.	P.	398.6	45	76	+30	62	+17
Denver, Colo.	T.	398.6	56	.....	.....	.....	.....
Philadelphia, Pa.	T.	398.6	47	.....	.....	71	+24
Baltimore, Md.	T.	397.0	46	.....	.....	47	+ 1
Cincinnati, Ohio	P.	397.0	56	50	+ 5	79	+23
Kansas City, Mo.	T.	397.0	45	.....	.....	.....	.....
St. Louis, Mo.	P.	397.0	53	55	− 4	72	+19
Washington, D. C.	P.	397.0	59	68	+ 8	.....	.....
Dodge City, Kans.	T.	396.2	60	.....	.....	.....	.....
Louisville, Ky.	T.	396.2	55	.....	.....	81	+26
San Francisco, Cal.	P.	396.2	44	84	+16	62	+18
Santa Fe, N. Mex.	T.	393.6	68	.....	.....	.....	.....
Little Rock, Ark.	T.	392.7	37	.....	.....	73	+36
Atlanta, Ga.	T.	391.6	50	.....	.....	79	+29
Wilmington, N. C.	P.	391.6	69	84	+ 6	83	+14
San Diego, Cal.	P.	390.5	78	91	+11	.....	.....
Phœnix, Ariz.	P.	390.5	80	72	+13	.....	.....
Savannah, Ga.	T.	389.9	59	.....	.....	.....	.....
Vicksburg, Miss.	T.	389.9	67	.....	.....	67	0
New Orleans, La.	P.	387.4	48	44	+ 9	50	+ 2
Galveston, Tex.	T.	386.4	35	.....	.....	.....	.....

* Records by both methods. † Records for only 21 days, for which the total possible duration of sunshine was 285.9 hours.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table X, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

The dates on which reports of thunderstorms for the whole country were most numerous were: 17th, 269; 20th, 204; 24th, 186; 28th, 196; 29th, 216.

Thunderstorm reports were most numerous in Illinois, 178; Iowa, 218; Minnesota, 204; Missouri, 249; Ohio, 279; Wisconsin, 180.

Thunderstorms were most frequent in: Iowa, Missouri, Nebraska, Wisconsin, 23 days; Michigan, 22; Minnesota, 20.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, the 1st, and also from the 21st to the 30th, inclusive. On the remaining twenty days of this month 138 reports were received, or an average of about 7 per day. The dates on which the number of reports especially exceeded this average were: 3d, 57; 4th, 44; 21st, 39.

Auroras were reported by a large percentage of observers in: North Dakota, 89; Wisconsin, 57; Michigan, 38; Minnesota, 43.

Auroras were reported most frequently in: North Dakota, 13 days; Michigan, 11; Wisconsin, 7; Minnesota, 6.

CANADIAN REPORTS.

Thunderstorms were reported as follows: 7th, Qu'Appelle; 11th, Port Stanley, Winnipeg; 12th, Saugeen; 17th, Toronto, White River, Port Stanley, Parry Sound; 18th, Port Arthur, Charlottetown; 20th, Port Stanley; 22d, Qu'Appelle; 25th, Swift Current; 27th, Qu'Appelle, Medicine Hat; 30th, Port Stanley.

Auroras were reported as follows: 2d, Prince Albert; 3d, Rockliffe, Port Arthur, Medicine Hat, Prince Albert; 4th, Rockliffe, Toronto, Medicine Hat; 5th, Father Point, Port Arthur, Winnipeg, Minnedosa, Battleford; 7th, Port Arthur; 8th, Father Point, Toronto; 9th, Father Point; 10th, Battleford; 11th, Quebec, Battleford; 12th, Battleford; 17th, Battleford; 20th, Quebec; 21st, Charlottetown, Father Point, Toronto, Minnedosa, Medicine Hat, Battleford; 22d, Charlottetown, Quebec, Toronto, Port Arthur; 23d, Father Point; 24th, Quebec; 26th, Port Arthur; 28th, Quebec; 30th, Battleford.

INLAND NAVIGATION.

The *extreme and average stages of water* in the rivers during the current month are given in Table VIII, from which it appears that a number of rivers attained the danger line, although the flood stages were of comparatively short duration. The Tennessee reached its highest point at Chattanooga on the 5th and at Johnsonville on the 12th; the Cumberland was highest at Burnside on the 2d and at Nashville on the 7th; the Ohio was highest at Cincinnati on the 4th. As a result of these and other high waters, the Mississippi was highest at Helena on the 17th and at New Orleans on the 23d.

METEOROLOGY AND MAGNETISM.

By Prof. FRANK H. BIGELOW.

For a description of the methods of constructing the tables and curves of Chart V, see the WEATHER REVIEW for October, 1895, and January, 1896. The numbers in the columns H. and D. are added respectively to the mean values for Washington and Toronto, i. e., H=0.18250; D=180.'0. The values of the vertical forces are omitted, as well as dz, s and a, which depend upon it. Stagnant eastward circulation continued during April, and summer continental conditions, with high areas on the coast and a low area in the central valleys prevailed. From the 11th to the 14th the Atlantic high was abnormally warm, causing an excess over the seasonal temperature. The solar magnetic type was inverse during the month.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective services.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 68.3°, or 4.8° above normal; the highest was 94°, at Tuscaloosa on the 23d and 26th, and at Pineapple on the 24th, and the lowest, 30°, at Healing Springs, Pineapple, and Valleyhead on 3d. The average precipitation was 3.75, or 1.37 below normal; the greatest monthly amount, 11.30, occurred at Pushmataha (of which amount 7.40 fell on the night of the 13th), and the least, 1.24 at Sturdevant.

Arizona.—The mean temperature was 60.3°, or 0.7° above normal; the highest was 97°, at Maricopa on the 27th, and the lowest, 8°, at Flagstaff on the 18th. The average precipitation was 0.21, or 0.27 less than normal; the greatest monthly amount was 3.00, at Pantano; no precipitation occurred at several stations.

Arkansas.—The mean temperature was 65.2°, or 2.4° above normal; the highest was 94°, at Warren on the 26th, and the lowest, 24°, at Keesees Ferry on the 2d and 3d. The average precipitation was 3.65,

or 1.15 below normal; the greatest monthly amount, 9.36, occurred at Forrest City, and the least, 0.46, at Fort Smith.

California.—The mean temperature was 52.8°, or 4.9° below normal; the highest was 1.00°, at Volcano Springs on the 29th, and the lowest, zero, at Bodie on the 1st. The average precipitation was 4.40, or 2.04 above normal; the greatest monthly amount, 18.45, occurred at Bowmans Dam, in the high mountain region; at a number of stations no precipitation occurred.

Colorado.—The month was warmer than usual. The highest temperature observed was 90°, at Lamar on the 26th, and the lowest, 16° below zero, at Breckenridge on the 1st and 2d. The precipitation was unevenly distributed, the greater portion of the State receiving less than half the normal amount, while over portions of the Divide and the counties on the eastern border more than the usual amount fell. The greatest monthly amount, 8.20, was reported from Stamford, while none occurred at Gunnison.

Florida.—The mean temperature was 71.0°, or about normal; the highest was 98°, at McClenny on the 25th, and the lowest, 36°, at Fort Meade, on the 3d, and at Lake Butler on the 5th. The average precipitation was 0.50, or nearly 2.00 below normal; the greatest monthly amount, 3.53, occurred at Milton, and many stations had only a "trace" or none at all. The month was one of the driest on record.

Georgia.—The mean temperature was 67.8°, or about 4.0° above normal; the highest was 96°, at Americus on the 24th, and the lowest, 29°, at Diamond on the 3d. The average precipitation was 1.77, or 1.89 below normal; the greatest monthly amount, 3.60, occurred at Marshallville, and the least, 0.25, at Fleming.

Idaho.—The mean temperature was 40.8°; the highest was 80°, at Payette on the 5th, and the lowest, 10° below zero, at Lake on the 1st. The average precipitation was 1.68; the greatest monthly amount, 4.81, occurred at Atlanta, and the least, 0.27, at Burnside.

Illinois.—The mean temperature was 59.0°, or 7.2° above normal; the highest was 95°, at New Burnside on the 15th, and the lowest, 13°, at Kishwaukee on the 2d. The average precipitation was 2.96, or 0.59 below normal; the greatest monthly amount, 6.81, occurred at Chemung, and the least, 1.07, at Palestine.

Indiana.—The mean temperature was 58.8°, or 5.9° above normal; the highest temperature was 93°, at Vincennes on the 29th, and the lowest, 13°, at South Bend on the 2d. This was the warmest April on record. The average precipitation was 1.81, or 1.69 below normal; the greatest monthly amount, 5.91, occurred at Angola, and the least, "trace" at Bloomington.

Iowa.—The mean temperature was 54.5°, or 5.5° above normal; the highest was 94°, at Cedar Rapids on the 15th and 16th, and the lowest, 10°, at Marshalltown and Rock Rapids on the 1st. It was the warmest April ever known in this State. The average precipitation was 5.02, or 2.42 above the normal; the greatest amount, 9.67, occurred at Cedar Falls, and the least, 2.35, at Keokuk.

Kansas.—The mean temperature was 60.6°, or 4.8° above normal; the highest was 97°, at Hays City on the 18th, and the lowest, 8°, at Colby on the 2d. It was the warmest April on record. The average precipitation was 3.84, or 1.41 above normal; the greatest monthly amount, 7.77, occurred at Russell, and the least, 102, at Coolidge.

Kentucky—The mean temperature was 63.6°, or 6.8° above normal; the highest was 96°, at Louisa on the 17th, and at Sandyhook on the 18th, and the lowest, 24°, at Leitchfield and Sandyhook on the 4th. The average precipitation was 1.65, or 2.71 below normal; the greatest monthly amount, 6.82, occurred at Sandyhook (5.15 of which amount fell on the 2d and 3d); the least, 0.13, was reported from Pleasure Ridge Park. Several observers report that this was the driest April "within the memory of the oldest inhabitant."

Louisiana—The mean temperature was 70.2°, or 1.3° above normal; the highest was 92°, at Davis on 24th, and at Liberty Hill on the 30th, and the lowest, 30°, at Davis on the 3d. The average precipitation was 3.59, or 0.42 below normal; the greatest monthly amount, 8.75, occurred at New Iberia, and the least, 0.50, at Napoleonville.

Maryland.—The mean temperature was 55.7°, or 4.1° above normal; the highest was 99°, at Millsboro, Del., on the 19th, and the lowest, 12°, at Deer Park on the 8th. The average precipitation was 1.42, or 2.29 below normal; the greatest monthly amount, 2.98, occurred at Grantsville, and the least, 0.49, at Great Falls.

Michigan.—The mean temperature was 48.7°, or 5.2° above normal; the highest mean for April during the past ten years. The highest temperature recorded was 92°, at Berlin on the 17th, and the lowest, 7° below zero, at Iron River on the 2d. The average precipitation was 2.99, or 0.75 above the normal; the greatest monthly amount, 5.10, occurred at Rockland, and the least, 1.25, at Hayes.

Minnesota.—The mean temperature was 44.5°; the highest was 84°, at Wabash on the 15th, and the lowest, 22° below zero, at Grande Portage on the 1st. The average precipitation was 5.91; the greatest monthly amount, 10.30, occurred at New London, and the least, 1.93, at Belleplaine.

Mississippi.—The mean temperature was 69.7°, or 5,0° above normal; the highest was 96°, at Rosedale on the 27th, and the lowest, 31°, at French Camp on the 3d. The average precipitation was 40.3, or 2.40 below normal; the greatest monthly amount was 10.64, at Williamsburg, and the least, 1.15, at Biloxi.

Missouri.—The mean temperature was 61.8°, or 6.8° above normal; the highest was 92°, at Oregon on the 15th, and the lowest, 17°, at Bethany on the 3d. It was the warmest April on record. The average precipitation was 3.54, or 0.22 below normal; the greatest monthly amount, 7.10, occurred at Shelbina, and the least, 1.11, at Tindall.

Montana.—The mean temperature was 40.0°, or about 3.0° below normal; the highest was 90°, at Billings on the 27th, and the lowest, 9° below zero, at Lewistown on the 16th. The average precipitation was 1.45, or 0.32 below normal; the greatest monthly amount, 5.02, occurred at Fort Custer, and the least, 0.02, at Utica.

Nebraska.—The mean temperature was 51.9°, or 2.9° above normal; the highest was 96°, at Wilber on the 26th, and the lowest, 4° below zero, at Alliance on the 2d. The average precipitation was 4.82, or 2.42 above normal; the greatest monthly amount, 11.22, occurred at York, and the least, 0.65, at Fort Robinson.

Nevada.—The mean temperature was 41.7°, or 4.8° below normal; the highest was 89°, at St. Thomas on the 8th, and the lowest, 9° below zero, at Stofiel on the 1st. The average precipitation was 1.00, or 0.22 above the normal; the greatest monthly amount, 3.99, occurred at Lewers Ranch, and the least, "trace," at Los Vegas.

New England.—The mean temperature was 45.8°, or 2.2° above normal; the highest was 97° at Hadley, Mass., on the 17th, and the lowest, 6°, at Kineo, Me., on the 8th. The average precipitation was 1.31, or 1.69 below the normal; the greatest monthly amount, 2.66, occurred at West Milan, N. H., and the least, 0.28, at Chelsea, Vt.

New Jersey.—The mean temperature was 52.4°, or 4.5° above normal; the highest was 98°, at Paterson, Millville, and Barnegat on the 18th, and the lowest, 12°, at Gillette on the 3d. The average precipitation was 1.35, or 2.12 below normal; the greatest monthly amount, 2.30, occurred at Elizabeth, and the least, 0.64 at Dover.

New Mexico.—The mean temperature was slightly below normal; the highest was 94°, at Roswell on the 22d, and the lowest, 6° below zero, at Labelle on the 1st. The precipitation was about normal; the greatest monthly amount, 2.68, occurred at Clayton; no precipitation occurred at several stations.

North Carolina.—The mean temperature was 62.3°, or 4.4° above normal; the highest was 98°, at Henderson and Salem on the 18th, and the lowest, 21°, at Highlands on the 3d, and at Linville on the 8th. The average precipitation was 1.99, or 1.79 below normal; the greatest monthly amount, 4.80, occurred at Linville, and the least, 0.64, at Wilmington.

North Dakota.—The mean temperature was 40.1°, or 2.5° below normal; the highest was 92°, at Medora on the 26th, and the lowest, 2°, at Dickinson on the 2d. The average precipitation was 4.37, or 2.65 above normal; the greatest monthly amount, 8.61, occurred at Sheyenne, and the least, 0.16, at Washburn.

A severe tornado occurred at 5 o'clock, p. m., Sunday, April 26, in the western portion of Barnes County, the most destruction to property occurring near Hobart, and one person was injured at that place. The tornado formed near the foot of Lake Eckelson and moved in a zig-zag course in a northeasterly direction, barns and a schoolhouse in its path being wrecked, and all of the buildings belonging to Nels Monson, a farmer, were destroyed. Monson was carried away with the house, and was afterward found in an unconscious condition, lying in a slough about 50 yards from where the house had stood. His injuries consisted of bruises and a broken arm, but were not fatal. The storm extended about 20 miles in length, and was only about 40 rods in width.

Ohio.—The mean temperature was 56.9°, or 6.3° above normal, and was the warmest April on record; the highest was 103°, at Thurman on the 17th and the lowest, 15°, at Orangeville on the 3d, and at Auburn and Hillhouse on the 8th. The average precipitation was 3.78, or 0.16 below normal; the greatest monthly amount, 6.87, occurred at Montpelier, and the least, 0.46, at Pomeroy.

Sandusky, Seneca, Erie, Wayne, and Stark counties were visited about 3 p. m. on the 20th by a severe storm, resulting in considerable damage, especially in Sandusky and Seneca counties; two lives were lost near Fremont, and fully a dozen people were injured near Fremont, Fostoria, and Alliance. The damage caused by the storm in Sandusky County is estimated at fully $100,000; and in Seneca County at about $10,000, averaging about $1,000 for the other counties referred to. Funnel-shaped clouds were observed near Fremont and Vickery at the time of the storm. Thunderstorms occurred generally over the State on the 20th, and hail fell in many places. The storm marked the close of ten days of extreme heat.

Oklahoma.—The mean temperature was 66.1°; the highest was 99°, at Hennessey on the 26th, and the lowest, 20°, at Pondcreek on the 2d. The average precipitation was 1.49; the greatest monthly amount, 3.67, occurred at Woodward, and the least, 0.69, at Clifton.

Oregon.—The mean temperature was 45.5°, or 2.4° below normal; the highest was 72°, at The Dalles on the 20th, and at Pendleton on the 24th, and the lowest, 10°, at Silver Lake on the 22d. The average precipitation was 5.98, or 2.19 above normal; the greatest monthly amount, 18.27, occurred at Langlois, and the least, 0.52, at Newbridge.

Pennsylvania.—The mean temperature was 53.0°, or 4.6° above normal; the highest was 97°, at Carlisle on the 18th, and the lowest, 4°, at Saegerstown on the 5th. The average precipitation was 1.75, or 1.76

below normal; the greatest monthly amount, 3.39, occurred at Pittsburg, and the least, 0.20, at Honesdale.

The characteristic features of April were its three distinctive periods of decided temperature conditions, which prevailed during the first, middle, and latter part of the month. From the 1st to the 12th the continued cold weather almost completely held in check all visible signs of growth in vegetation, and spring seemed to make no advancement. This period of cold was followed by one of ten days of torrid heat. During this period growth was as marvelous as the unprecedented heat. Cereals and grasses sprang up as if by magic, trees burst into leaf and blossom, and the face of nature was rapidly changed from its dress of winter to its garb of spring. This rapid growth was somewhat checked by the cool weather which followed and prevailed from the 22d to the end of the month. The season, which was backward at the beginning of April, was fully up to the average at its close. Numerous frosts were reported on the 23d, but they were not damaging.

South Carolina.—The mean temperature was 66.9°, or 4.1° above normal; the highest was 98°, at Gillisonville on the 17th, and the lowest, 30°, at Santuc on the 9th. The average precipitation was 1.31, or 1.83 below normal; the greatest monthly amount, 2.46, occurred at Mount Carmel, and the least, 0.19, at Yemassee.

South Dakota.—The mean temperature was 47°, or about 3° above normal; the highest was 93°, at Faulkton on the 27th, and at Nowlin on the 26th, and the lowest, 4°, at Clark on the 2d, and at Wentworth on the 1st. The average precipitation was 4.85, or 2.50 above normal; the greatest monthly amount, 8.30, occurred at Webster, and the least, 1.39, at Cross.

Tennessee.—The mean temperature was 64.8, or more than 5.0° above normal; the highest was 98°, at Andersonville on the 25th, and the lowest, 25°, at Cookeville and Greenville on the 4th. The average precipitation was 3.70, or about 0.50 below normal; the greatest monthly amount, 6.50, occurred at Tullahoma, and the least, 1.70, at McKenzie.

Texas.—The mean temperature was 1.2 above normal; the highest was 104°, at Fort Ringgold on the 29th, and the lowest, 15°, at Happy on the 2d. The average precipitation was 1.22 below normal; the greatest monthly amount, 6.14, occurred at Kerrville; there was no precipitation at Midland and Sierra Blanca.

Utah.—The mean temperature was 41°; the highest was 87°, at Cisco on the 25th, and the lowest, 1° below zero, at Grover on the 1st. The average precipitation was 1.07; the greatest monthly amount, 3.83, occurred at Park City, and the least, "trace," at Castlegate, Cisco, and Giles.

Virginia.—The mean temperature was 58.6°; the highest was 100°, at Bonair on the 18th and 19th, and the lowest, 10°, at Guinea on the 8th. The average precipitation was 1.61, which is decidedly below the normal; the greatest monthly amount, 3.71, occurred at Blacksburg, and the least, 0.41, at Alexandria.

Washington.—The mean temperature was 45.1°, or 1.9° below normal; the highest was 80°, at Connell on the 25th, and the lowest, 12°, at Cascade Tunnel on the 1st and 3d. The average precipitation was 3.85, or 0.07 above normal; the greatest monthly amount, 9.91, occurred at Queets, and the least, 0.29, at Moxee.

West Virginia.—The mean temperature was 57.9°, or about 6.0° above normal; the highest was 95°, at Point Pleasant on the 18th, and the lowest, 12°, at White Sulphur Springs on the 8th. The average precipitation was 2.06, or 1.30 below normal; the greatest monthly amount, 4.35, occurred at Wheeling, and the least, 0.82, at Raleigh.

Wisconsin.—The mean temperature was 46.0°, or 2.0° above normal; the highest was 87°, at Prairie du Chien on the 15th, and the lowest, 7° below zero, at Spooner on the 5th. The average precipitation was 5.02, or more than twice the normal; the greatest monthly amount, 8.19. occurred at Viroqua, and the least, 1.18, at Crandon.

Wyoming.—The mean temperature was 41.0°, or about 1.0° above normal; the highest was 84°, at Fort Laramie on the 27th, and the lowest, 2° below zero, at Wise on the 18th. The average precipitation was 1.63, or slightly below normal; the greatest monthly amount was 3.53, at Laramie, and the least, 0.55, at Wheatland.

SPECIAL CONTRIBUTIONS.

RECENT PUBLICATIONS ON METEOROLOGY.

By Dr. J. H. McCARTY, Librarian Weather Bureau.

In response to requests from several correspondents, the Chief of the Weather Bureau has directed that there be published regularly in this REVIEW a list of recent publications bearing on meteorology and such other subjects as come within the field of study of the officials of the Weather Bureau. In this list of authors and titles the works that have been received by the Library of the Weather Bureau will take precedence, but other works whose titles are known will also be mentioned, although they have not yet been received, in order that the correspondents of the Weather Bureau may thus receive early notice of the publication of works in which they are interested. It is to be understood, however, that those who wish to consult the works on meteorology received by the Weather Bureau must do so in its own Library, where every convenience for study is afforded, as, in fact, is also the case in all the other scientific libraries in Washington.

Argentina.—*Boletino del Instituto Geografico Argentino.* Publicado bajo la direccion del Sr. Presidente del Instituto, Dr. Alejandro Sorondo. Tomo XVII—cuadernos 1, 2, 3. 119 pp. 2 maps. 8vo. Buenos Aires. 1896.

Batavia.—*Observations made at the magnetical and meteorological observatory at Batavia in the year* 1894, *with appendix.* Vol. XVII. Published by the Government of Netherlands in India. 233 pp. 14 by 10. Batavia. 1895.

Batavia.—*Rainfall in the East India Archipelago.* Sixteenth year, 1894. 421 pp. 8vo. Batavia. 1895.

England.—*Results of meteorological observations made at the Radcliffe Observatory, Oxford, in the years* 1888-1889 *under the superintendence of Edward James Storrs, F. R. S.* Vol. XLV. 8vo. Oxford. 1896.

England.—Burrough of Southport, Fernley Observatory. Meteorological Department. *Report and results of observations for the year* 1895. Two appendices. Joseph Baxendal, Meteorologist to the Corporation. 31 pp. 8vo. Southport. 1896.

England.—Liverpool Observatory, Bidston, Birkenhead. Report of the Director of the Observatory to the Marine Committee and meteorological results deduced from the observations taken in the year, 1895. 40 pp. 8vo. Liverpool. 1896.

MacDowell, Alex. B.—*Weather and Disease.* A curve history of their variations in recent years. 82 pp., with charts. Large 12mo. London. 1895.

France.—Service hydrometrique du Bassin de la Seine.—*Resume des observations centralisees (par le Service Hydrometrique du Bassin de la Seine) pendant l'annee* 1894. 56 pp. 8vo. Versailles. 1895.

France.—Service hydrometrique du Bassin de la Seine. Observations sur les cours d'eau et la pluie centralisees pendant l'annee, 1894. Mr. G. Lemoine et Mr. Babinet, ingenieurs. 7 feuilles folio. Versailles. 1895.

Germany.—Annalen der Physik und Chemie. Neue Folge. Band. LVIII, No. 5. 205 pp. 8vo. Leipzig. 1896.

Great Britain.—*Official Year Book of the scientific and learned societies of Great Britain and Ireland.* Comprising a list of the papers read during the year 1895. Thirteenth annual issue. 262 pp. 8vo. London. 1895.

Hamburg.—*Jahrbuch der Astronomie und Geophysik* enthaltend die wichtigsten Fortschritte auf den Gebieten der Astrophysik, Meteorologie, und physikalischen Erdkunde. Von Dr. Hermann J. Klein. VI Jahrgang. 1895. 5 Lichtdruck und Chromotafeln. 376 pp. 8vo. Leipzig. 1896.

Hamburg.—Aus dem Archiv der Deutsche Seewarte. XVIII Jahrgang. 1895. Herausgegeben von der Direction der Seewarte. *No.* 1.—*Oberflachentemperatur und Stromungsverhaltnisse des Aequatorialgurtels des Stillen Oceans.* Von Dr. Casar Puls. (See Met. Zeit. Heft. 5, 1896. Bibliographie.) No. 2.—*Bericht und Gutachten uber der Versuche bezuglich der Abblendung der Schiffs-Seiten lichter.* Ausgefuhrt im Sommer, 1895, auf Anordnung des Reichs Marine amtes, von der Direktion der Deutschen Seewarte. Mit einer Kurven-Tafel. No. 3.—*Vergleichende Regenmessungen an der Deutschen Seewarte.* Von Prof. Dr. W. J. Van Bebber. Mit 1 lithograph Tafel. No. 4.—Der Isobarentypen des Nord atlantischen Ozeans und Westeuropas, ihre Beziehungen zur Lage and Bewegung der barometrischen Max. und Min. Prof. Dr. W. J. Van Bebber und Prof. Dr. W. Koeppen. Mit 23 lithog. Karten. No. 1, 38 pp.; No. 2, 28 pp.; No. 3, 14 pp.; No. 4, 27 pp. 4to. Hamburg. 1895.

Holland.—Rotterdam. A magnetic survey of the Netherlands for the epoch January 1, 1891. By Dr. Van Rijckevorsel. Part 1, *The observations;* Part 2, *The disturbances.* 103 pp. 10 maps. 4to. Rotterdam. 1895.

India.—Madras Observatory. *Daily meteorological means.* By C. Michin Smith, Government Astronomer. Includes mean hourly barometric variations from daily means for 20 years. 14 pp. 4to. Madras. 1896.

Klagenfurt.—*Diagramme der magnetischen und meteorologischen Beobachtungen zu Klagenfurt.* Von Ferdinand Seeland. Witterungsjahr, 1894. December, 1893–November, 1894. 7 charts. 4to.

Lisbon.—*Annaes do Observatorio do Infante D. Luiz.* Trigesimo. Setimo Anno. 1891. Vol. XXIX. 139 pp. Fol. Lisbon.
The same. Octavo Anno. 1892. Vol. XXX. 139 pp. Fol. Lisbon.

Mexico.—*Boletin mensual meteorologico y agricola del Observatorio Central del estado de Vera Cruz Llave.* 8 pp. 4to. Xalapa-Enriquez. 1896.

Netherlands.—*Archives Neerlandaises des sciences exactes et naturelles.* Tome XXX. 1re. livraison. Soc. Holland. d. Sciences. J. Bosscha, Secr. 99 pp. 8vo. Harlem, 1896.

Nova Scotia.—Proceedings and transactions of the Nova Scotian Institute of Science. Sessions of 1894–95. Vol. IX being Vol. II of the second series. Part I. 6 plates. 100 pp. 8vo. Halifax. 1896.

Roumania.—L'Institut Meteorologique. *Annales de l'Institut Meteorologique de Roumanie pour l'annee* 1894. Par Stefan C. Hepites. Tome X. In parts. 4to. Bucarest et Paris. 1895.

Russia.—Expedition der Kaiserlich. Russischen Geographischen Gesellschaft. *Beobachtungen der Russischen Polarstation an der Lenamundung.* 1 *Theil: Astronomische und magnetische Beobachtungen,* 1882–84. Bearbeitet von V. Fuss, F. Mueller, und N. Juergens. Herausg. unter Redaction von Dr. A. von Tillo. Portraits. Russ. and German text. 4to. 1895.

Saxony.—*Bericht über die Thatigkeit im Konigl. Sachsischen meteorologischen Institut für das Jahr* 1894. Mit 6 Anhangen und 4 Tafeln. XII Jahrg. 2te Halfte. Prof. Dr. Paul Schreiber, Director. 81 pp. 4 Tafeln. 4to. Chemnitz. 1895.

South Africa.—Colony of Natal. *Annual report of the Superintendent of the Natal Observatory for the year* 1894–95. 41 pp. Fol. Pietermaritzburg. 1896.

United States of America.—Proceedings of the American Association for the Advancement of Science.—*Forty-fourth meeting held at Springfield, Mass., August-September,* 1895. Pages CXIX, 414. 8vo. Salem, Mass. 1896.

California.—*Report of work of the Agricultural Experiment Stations of the University of California for the year* 1894–95, *being a part of the Reports of the Regents of the University.* E. W. Hilgard, Director. Illustrated. 481 pp. 8vo. Sacramento. 1896.

Hyde, G. A.—Voluntary Observer U. S. Weather Bureau. Forty years of weather at Cleveland, Ohio. 33 pp. 8vo. Cleveland. 1896.

Maryland.—*The climatology and physical features of Maryland.* Second biennial Report of the Maryland State Weather Services for the years 1894, 1895. 110 pp. 5 maps. Baltimore. 1895.

Noyes, Isaac P.—*Phenomenal heat of* 1896. Reprint from Providence (R. I.) Journal of May 10, 1896. 4 pp. 8vo. Washington. 1896.

Yale University.—Astronomical Observatory. Researches with the Heliometer. Triangulation of the principal stars of the cluster in Coma Berenices. By Fred. L. Chase, Assistant Astronomer. Vol. I. Pt. V. Pages. 213–254. 4to. New Haven.

Bureau of American Republics.—Monthly Bulletin, Vol. III. No. 11. **Brazil.**—*Minerals and mining industries.* **Costa Rica.**—*Sugar industry.* **Guatemala.**—*Tariff changes in English and Spanish.* **Mexico.**—*Trade of Vera Cruz.* Amendment to the Constitution abolishing Inter-State duties. Pages 613–680. Supplement. 8vo. Washington, D. C. 1896.

KITE EXPERIMENTS AT THE WEATHER BUREAU.

By C. F. MARVIN, Professor of Meteorology, U. S. Weather Bureau (dated July, 1896).

In November, 1895, the present writer was directed by Prof. Willis L. Moore, the Chief of the Weather Bureau, to consider the subject of devising kites and auxiliary apparatus for the meteorological exploration of the upper air. The definite object was to attain a height of at least 1 mile and, if possible, 10,000 feet or more, and to bring down continuous records of temperature, moisture, pressure, and wind. A considerable acquaintance with the present state of the art of making and flying kites showed that both the form of the body of the kite and the analysis of the action of the forces that affected it demanded fuller consideration than had hitherto been given. In view of the rapidly increasing interest in this subject it seems proper to lay before the cooperating observers of the the Weather Bureau the results that have been attained during the past few months, in order that those interested in the subject may in conducting their own experiments, profit by our experience.

With the advance of the science of meteorology, and especially with the progress in the development of the fundamental laws governing atmospheric phenomena, a growing need arises for accurate knowledge of the conditions of the atmosphere with respect to its motion, temperature, pressure, moisture, etc., not only near the surface of the earth but particularly in the higher strata, where the forces in action have full scope and their effects are unmodified by such disturbing influences as exist near the surface.

Meteorological stations have been maintained on lofty mountain summits, in order to procure the desired information, and many perilous balloon voyages have been made with the express object of making accurate measurements of the atmospheric conditions at all elevations. Some use has been made of captive balloons, and within a few years remarkable results have been obtained in Europe by the use of free balloons of small size equipped with automatic instruments. Having no load of ballast to carry, these balloons when set free shoot upward with great velocity and attain very lofty elevations, whereupon, losing all effective lifting force by reason of the expansion and overflow of gas incident to the great diminution of pressure in the rarified strata of air, the partially inflated bag falls to the earth after a comparatively short journey. A notice attached to the balloon gives instructions respecting its disposition, and the finder receives a small reward for its safe return.

It appears, however, that even before balloons were invented, Dr. Alexander Wilson of Glasgow employed tandems of kites "to explore the temperature of the atmosphere in the higher regions." I am indebted to Professor Abbe for the following extract[1] giving an account of Dr. Wilson's experiments, which, owing to their early date and complete and interesting character, deserve special mention:

* * * * * * *

Among the more advanced students, who, in the years 1748 and 1749 attended the lectures on Divinity in the University, was Mr. Thomas Melvill, so well known by his mathematical talents, and by those fine specimens of genius which are to be found in his posthumous papers, published in the second volume of the Edinburg Essays, Physical and Literary. With this young person Mr. Wilson then lived in the closest intimacy Of several philosophical schemes which occurred to them in their social hours, Mr. Wilson proposed one, which was to explore the temperature of the atmosphere in the higher regions, by raising a number of paper kites, one above another, upon the same line, with thermometers appended to those that were to be most elevated. Though they expected, in general, that kites thus connected might be raised to an unusual height, still they were somewhat uncertain how far the thing might succeed upon trial. But the thought being quite new to them, and the purpose to be gained of some importance, they began to prepare for the experiment in the spring of 1749.[2]

Mr. Wilson's house at Camlachie was the scene of all the little bustle which now became necessary, and both Mr. Melvill and he, alike dexterous in the use of their hands, found much amusement in going through the preliminary work, till at last they finished half a dozen large paper kites, from 4 to 7 feet in height, upon the strongest, and at the same time upon the slightest construction the materials would admit of. They had also been careful in giving orders early for a very considerable quantity of line, to be spun of such different sizes and strength, as they judged would best answer their purpose; so that one fine day, about the middle of July, when favored by a gentle, steady breeze, they brought out their whole apparatus into an adjoining field, amidst a numerous company, consisting of their friends and others, whom the rumor of this new and ingenious project had drawn from the town.

They began with raising the smallest kite, which being exactly balanced, soon mounted steadily to its utmost limit, carrying up a line, very slender, but of strength sufficient to command it. In the meantime the second kite was made ready. Two assistants supported it

[1] Extract from Biographical account of Alexander Wilson, M. D., late Professor of Practical Astronomy in Glasgow, by the late Patrick Wilson, A. M., Professor of Practical Astronomy in the University of Glasgow. Transactions of the Royal Society of Edinburgh, Vol. X, Part II, pp. 279–297. 1825.

This memoir of Dr. Wilson, after being read at the Royal Society, February 2, 1789, was withdrawn by its author for the purpose of making some alterations upon it, and was never returned for publication. It was found, however, among the papers of Mr. Patrick Wilson, and is now printed with the consent of his family.

[2] As no public notice has hitherto been taken of this matter, though Mr. Wilson had always some thoughts of doing so, it is hoped that the following detail will not prove unacceptable or tedious to the reader.

between them in a sloping direction with its breast to the wind and with its tail laid out evenly upon the ground behind, whilst a third person, holding part of its line tight in his hand, stood at a good distance directly in front. Things being so ordered, the extremity of the line belonging to the kite already in the air was hooked to a loop at the back of the second, which being now let go, mounted very superbly, and in a little time also took up as much line as could be supported with advantage, thereby allowing its companion to soar to an elevation proportionally higher.

Upon launching these kites according to the method which had been projected, and affording them abundance of proper line, the uppermost one ascended to an amazing height, disappearing at times among the white summer clouds, whilst all the rest, in a series, formed with it in the air below such a lofty scale, and that, too, affected by such regular and conspiring motions as at once changed a boyish pastime into a spectacle which greatly interested every beholder. The pressure of the breeze upon so many surfaces communicating with one another was found too powerful for a single person to withstand when contending with the undermost strong line, and it became, therefore, necessary to keep the mastery over the kites by other means.

This species of ærial machinery answering so well, Mr. Wilson and Mr. Melvill employed it several times during that and the following summer in pursuing those atmospherical experiments for which the kites had been originally intended. To obtain the information they wanted, they contrived that thermometers, properly secured, and having bushy tassels of paper tied to them, should be let fall at stated periods from some of the higher kites, which was accomplished by the gradual singeing of a match-line.

When engaged in these experiments, though now and then they communicated immediately with the clouds, yet, as this happened always in fine weather, no symptoms whatever of an electrical nature came under their observation. The sublime analysis of the thunderbolt, and of the electricity of the atmosphere, lay yet entirely undiscovered, and was reserved two years longer for the sagacity of the celebrated Dr. Franklin. In a letter from Mr. Melvill to Mr. Wilson, dated at Geneva, 21st of April, 1753, we find, among other particulars, his curiosity highly excited by the fame of the Philadelphian experiment, and a great ardour expressed for prosecuting such researches by the advantage of their combined kites. But, in the December following, this beloved companion of Mr. Wilson was removed by death, to the vast loss of science, and to the unspeakable regret of all who knew him.

The limits of the present article preclude giving anything like a full historical notice of the use of kites for scientific purposes or for securing observations of the meteorological conditions of the upper air. A few references only will be given if with no other object than simply to show that the application of kites to practical, useful purposes is by no means a novel idea of the last few years, as some appear to think. Mr. W. R. Birt[1] on the 14th of September, 1847, flew a specially constructed kite at the Kew Observatory, in order to test and demonstrate its usefulness in obtaining measures of temperature, humidity, wind velocity, etc. The kite was caused to assume a more fixed position in the air by restraining it by means of three strings secured to the ground at the three corners of a comparatively large equilateral triangle.

Admiral Bach,[2] when in command of the *Terror*, used a kite to obtain the temperature of the upper air in Hudson Strait.

Espy, in his Philosophy of Storms, p. 167, states that "The Franklin Kite Club, at Philadelphia, have lately discovered[3] that in those days, when columnar clouds form rapidly and numerously, their kite was frequently carried upward nearly perpendicularly by columns of ascending air." The existence, for brief periods, of strongly ascending currents of air has also been repeatedly noticed in the Weather Bureau experiments.

E. Douglas Archibald[4] in England advocated the use of "A kite, or a series of kites flown tandem, that is, one above the other" for showing the direction of air currents, and for attaching thermometers, anemometers, etc., so that the condition of the air in the upper currents could be determined.

Experiments of this character were first regularly begun by Archibald[5] in November, 1883; the particular object in view being to ascertain the increase of wind velocity with elevation, Biram's anemometers being attached to the kite string for this purpose. The kites were diamond shape, with tails, and were flown tandem. Flax string was first employed, but acting upon the suggestion of Sir William Thomson, steel pianoforte wire was substituted, on which Archibald remarks:

> This I have found a great improvement on the string. It is double the strength, one-fourth the weight, one-tenth the section, and one-half the cost.

A summary of the results obtained by Archibald will be found in Nature, Vol. XXXIII, 1885–86, p. 593.

Archibald also devised and made some use of a captive kite balloon which he described in Nature, Vol XXXVI, 1887, p. 278. This combination was designed to obviate the detrimental action of the wind on the balloon surfaces. As the balloon kite has often been proposed as of great utility it will be worth while to notice the results of Archibald's tests. The balloon had a capacity of 113 cubic feet; the octagonal kite measured 7 by 9 feet. Twelve hundred feet of steel pianoforte wire was paid out. Wind at Greenwich 12 miles per hour. The angles of elevation were as follows: Balloon alone, 38°; wire near ground, 18°. Balloon with kite, 41.5°; wire near ground, 35°.

It is observed the effect of the kite was to increase the angular elevation of the balloon 3.5°, but the angle itself was only 41.5°. Now, any good kite is easily capable of sustaining 1,200 feet of steel wire so that both the kite and the wire will have an angular elevation of at least 60° and 58°, respectively. It appears, therefore, that under favorable conditions the kite is able to help the balloon, but the balloon, on account of the large surface exposed to the wind, will only serve to drag down the kite to a much lower position than it would attain alone. If little or no wind blows the balloon alone is sufficient, and is only trammelled by the presence of a kite.

In 1890 William A. Eddy, of Bayonne, N. J., "began experiments to determine the relations between the width and length of the ordinary kite." The object in view was "to evolve the best form of kite to be used in raising self-recording meteorological instruments to a great height, because many important problems in meteorology would be affected by investigations of the upper air currents." Beginning with star and hexagon kites with tails, Mr. Eddy was led to the reinvention of the so-called Malay tailless kite, a form which within recent years has, perhaps, been more extensively used for scientific purpose than any other.

The kite experiments made at Blue Hill under the direction of Mr. A. Lawrence Rotch, have aimed particularly to secure observations of the atmospheric conditions at as high elevations as possible. The work appears to have begun in the fall of 1894. Kites of the Malay or Eddy type were used at first and other forms later. A number of actual records of the temperature, pressure, and moisture contents of the air, also of wind velocity, have been obtained at various elevations up to something less than 4,000 feet, and the work reflects much credit upon the proprietor of the observatory and his assistants.

Probably the most remarkable modern inventor of kites is Mr. Lawrence Hargrave, of Sydney, N. S. W., Australia. Mr. Hargrave contributed an important paper to the meeting of the Aeronautical Congress, held in Chicago at the time of the World's Fair, 1893. In this paper were described models of flying machines and of the peculiar cellular kites which were afterwards greatly developed by the inventor and have since become widely known among kite experts. The description of the Hargrave cellular kites, which appeared in the American Engineer for April, 1895, p. 193, has brought these kites to the attention of some of the experimenters in the United States. In an article entitled "A Weather Bu-

[1] Phil. Mag., Vol. XXXI, 1847, p. 191.
[2] Quart. Journal, Met'l Soc., Vol. IX, 1883, p. 63.
[3] Probably about 1837.
[4] Quart. Journal, Met'l Soc., Vol. IX, 1883, p. 63.
[5] Nature, Vol. XXXI, 1884–1885, p. 66.

reau Kite," in the WEATHER REVIEW, for November, 1895, the writer credited Mr. S. A. Potter with being "the first in the United States to successfully construct and fly kites of this kind." The Aeronautical Annual for 1896, which did not reach the hands of the writer until after the article referred to had been written, contained accounts of successful experiments with the cellular kites by both Charles H. Lamson and J. B. Millet. The date of Mr. Lamson's experiments is not given. The work of Mr. Millet was done during August and September, 1895. Experiments were also made at Blue Hill with cellular kites in August, 1895, which were described in the Boston Herald, August 19, 1895, and Springfield Republican, August 21, 1895. It does not seem that this type of kite was then regarded with much favor or that further experiments with this form were actively pushed. Mr. Eddy also tried the cellular kites, at first on September 1, 1893, and again in December, 1895, but with unsuccessful results. He was finally successful in flying the kite independently for the first time on December 9, 1895. Mr. Potter's work can therefore scarcely claim to be first in mere point of time, the results, however, were highly successful and promising and this type of kite at once superceded all other forms in the Weather Bureau work.

The kite experiments at the Weather Bureau were first taken up by Mr. Alexander McAdie and Mr. S. A. Potter, only semiofficially, however. The work began early in November, 1894, and was carried on wholly outside of office hours and in addition to other regular duties. Nevertheless, owing to the industry and skill of Mr. Potter a large number of kites, mostly of the Malay type, were flown successfully from time to time at Mr. Potter's country residence. No methodical record of the progress of the work appears to have been kept, nor were instrumental or other accurate observations made of the results attained. A small thermograph, constructed mostly of aluminum, was purchased during the following spring from Richard Bros., and records of air temperatures at elevations of a few hundred feet were obtained on several occasions during the ensuing summer. The thermograph proved to be imperfect and ill adapted to the work. On one occasion a tandem of eleven Malay kites was successfully flown. A suitable reel for controlling the string with which the kites were flown was found indispensable, and a very convenient and efficient affair was devised by Mr. Potter.

The work finally assumed the character of an official investigation only in the fall of 1895. Prof. Willis L. Moore, as the new Chief of the Weather Bureau, at once recognized the great importance of extending the observations of the Weather Bureau into the upper atmosphere in order to advance the knowledge of storm generation and improve the daily forecasts. Mr. McAdie being detailed for duty at the office in San Francisco, Prof. H. A. Hazen, with Mr. Potter's assistance, was directed, on October 14th, 1895, to make experiments for the purpose of devising and perfecting an appliance that might be used in observing the meteorological conditions of the upper air. Subsequently, namely, November 18, 1895, the writer was also directed by Professor Moore, in addition to his other duties, to investigate the problem of constructing appliances for carrying meteorological instruments into the upper air. Professor Moore has himself proposed two different devices as being possibly of use in the solution of the problem in hand; namely, the combination of a kite and balloon, by which the desired observations can be obtained not only when the wind blows, but during calms or when the wind is too light to make the flying of kites alone successful, and a device constructed on the general plan of what we may call a soaring top. In fact, a toy of this character appears to have first suggested the idea to Professor Moore. The toy consists of a thin metal or card-board disk, cut up into a number of equally distributed radial gashes extending nearly to the center. The surfaces are then twisted or bent so as to take an oblique position, screw propeller fashion, in reference to the general plane of the disk. In fact, the disk resembles very much a small fan wheel, such as is commonly seen on electric fans. At the center the disk is fitted with a small axle at right angles. A suitable holder is provided, and when the disk is given a high speed of rotation by the unwinding of a string from the axle, as in spinning a top, the disk lifts out of the holder and soars to a considerable height in the air. Such a device, on the proper scale, either started at high velocity from the earth, or carrying its motor with it, may possibly be made to accomplish the desired results.

Professor Moore's aim has been to reach higher altitudes than those which have been heretofore attained by ordinary kites. Special funds were not available for costly experiments with balloons or combination affairs; moreover, kites themselves not only on account of their slight cost but also because of their general effectiveness, seemed the most promising subject for the first investigations. The effort has been therefore to develop the kite to the highest point of efficiency and ascertain to what extent it can be utilized in reaching elevations of from 1 to 2 miles or more.

The work at the present time is still in an experimental stage as it were, but it is believed enough has been accomplished to justify publishing preliminary results in the hope that the progress already made in the Weather Bureau investigations will stimulate to new efforts, and be helpful to the several private experimenters independently at work on the same problem, and if possible, therefore, hasten complete success.

On scientific methods in kite investigations.—While the literature on kites describes an almost endless variety of forms and shows some to have been employed in useful ways, that is, for drawing wagons, sleds in the Arctic regions, boats, etc., or for other purposes and for securing meteorological observations, of which latter use we have mentioned above a few cases only, yet no writer seems to have fully discussed the action of the kite from a scientific standpoint, or analyzed and explained the physical and mechanical principles involved therein. Sir Isaac Newton is said to have taught the boys how to fly their kites, but if one desires to learn much about the mechanics of a kite in action, a search in kite and aeronautical literature will prove fruitless, or nearly so; at least such has been the experience of the writer in the partial search that he has thus far been able to make. Some investigators in recent times, while spending years of work with the avowed purpose of developing the kite for useful purposes, have either assumed the deplorable attitude of discrediting the value of technical or so-called theoretical considerations as applied to kites, or have struggled on by cut-and-try processes in blissful ignorance of the real character of those laws of nature whose operation they seek to control.

It is unfortunate, to say the least, that any investigator of kites of the present day, having the benefits of modern advanced education, should entertain the scornful regard that seems to be current with some for the "theory" of kite flying, especially when the history of applied science affords such remarkable illustrations of the immense debt *practice* owes to *science*. There could be no greater mistake than to contemptuously confound science with theory. No more striking instance of the efficacy of scientific methods can be cited than to outline and contrast the growth of the steam engine and electric generators, motors, etc. Although Hero, 120 years B. C., described crude forms of heat engines, steam engines did not begin to be really useful until about the middle of the 17th century. For nearly 200 years thereafter the steam engine underwent a slow and tedious evolution, improving but little in the hands of men ignorant of the laws of thermodynamics. In fact, those laws were quite un-

known. Towards the close of this period such men as Carnot, Joule, Clausius, Thomson, and others began to develop the principles of thermodynamics, and Rankine, less than forty years ago, with a master's hand, applied these principles to the practical problems in steam engineering. From this point on the development was very rapid. What 200 years, yes, 2,000 years, counting from Hero, failed to make of the steam engine was effected in a score of years when science pointed the way. The steam engine came into existence and underwent its slow and tedious development by blind experimentation before the rationale of its action was known or understood. The reverse is the case with electric generators, motors, etc. All the principal elements of their theory had been fully developed before the devices were invented. The result is that almost the highest possible state of perfection of these inventions was attained in a few years. Not only was the theory already available but it was developed and applied at every point in the construction and operation of these wonderful machines. The world now stands amazed at the marvelous rapidity of this growth. In the face of such facts as these, can anyone fail to perceive the importance and advantage of formulating the physical laws involved in the operation of any of nature's forces? Let us hope, therefore, that those who seek to develop and perfect the kite in order to apply it to useful purposes will help first to formulate the laws of all the actions involved.

The construction and flying of kites on a large scale is purely and only an engineering problem. It is simply a question of stresses and strains, a question of the strength and resistance of materials, of the operation and equilibrium of certain well-defined forces. In fact, every element of the problem comes within the domain of ordinary mechanics and physics. Kites are amenable to development by the same engineering methods as those that have produced such wonderful results as the Forth Bridge, the Brooklyn Bridge, the Eiffel Tower, the Ferris Wheel, swift ocean steamers, those famous yachts Mayflower, Vigilant, Puritan, Defender, and others. Now that it is desired to put kites to certain useful applications, it is urged upon those who seek to effect this development that they discard the primitive cut-and-try method and adopt modern engineering methods. The cut-and-try method is good in a certain sense; it is like nature's method of "natural selection," but its operation is exceedingly slow. If time enough is expended in constructing and testing all conceivable kinds of kites, selecting the best, rejecting the inferior, it is possible that a kite may be evolved approaching the maximum possible efficiency, but the engineer has a short cut to this result. He analyzes the action of the kite in every detail; the efficiency of every element is studied separately. By these methods he is soon able to discover and lop off this or that useless member, to increase the efficiency of others and to introduce new members of peculiar and useful function.

When kites are used for carrying strings or ropes to inaccessible distant points, as from a stranded ship to the lee shore, or when used for transportation, as in pulling wagons, or towing boats, it is the object of the constructor to obtain the greatest possible tension or pull on the string, as held by the manipulator at the lowest end near the ground. But for meteorological use we need to have the greatest possible lifting power at the kite end. We must, therefore, develop the vertical and diminish the horizontal component of the pull on the string.

To be more specific, the kind of information needed, for example, is: (1) What is the relative lifting power in a given wind, square foot for square foot, of the single-plane kites, as compared with the cellular kites? (2) In cellular kites, (*a*), how near can the lifting surfaces be to each other without detrimental interference? (*b*) How short a distance may exist between the forward and after cell without the one impairing the effectiveness of the other? (*c*) What length, fore and aft, is the most effectual for the sustaining surfaces? (*d*) What is the most appropriate form and arrangement of the bridle, not only to secure the most satisfactory action of the kite under winds of variable force, but to likewise distribute the strain upon the framework so that lightness, but yet not corresponding weakness of construction, may obtain? (3) In general, for any kite, what is the best angle of incidence? (4) What is the loss due to the pervious structure of the cloth, as compared with paper or balloon fabric, etc.? These are but a few of the elements of the kite problem that need to be separately studied and in respect to which the maximum possible useful effects need to be developed and rendered available to the kite builder.

The writer has been led to make these remarks because so little or none of this kind of work appears to be contemplated by the several experimenters now independently at work trying to render the kite useful for meteorological and other purposes. Moreover, the above considerations should convince one that a line of analysis seeking to develop all the elements of kite behavior and formulate their relations is the shortest path to the complete solution of the problem.

THE WEATHER BUREAU WORK.

A few remarks describing the management of kites will enable the reader, unfamiliar with what we may call modern scientific kite flying, to form an idea of how the work is carried on. Details of the forms and construction of the kites will be given later. The kites range in size from 6 to 10 feet high, and are, therefore, easily carried about by one person.

The act of starting off or flying any of the larger kites is a very simple matter, especially when the wind is favorable and the kite a good flyer. With steady winds of about 15 miles per hour, the kite when faced to the wind will generally fly right up from the hand, sailing away and upward at an angle of from 30° to 50°. It is necessary only to keep the string under some tension as it is paid out. When the wind is rather feeble, especially if very light at the surface, it will generally be necessary for an assistant to carry the kite off some distance to leeward; seven or eight hundred feet is often not too far. When a favorable puff of wind is felt the assistant tosses the kite upward into the air. At the same moment the string, if managed by a reel, is wound in with sufficient rapidity to cause the kite to fly until fully sustained by the wind. A reel for managing the string is quite indispensable for extensive experiments, but in its absence it may be necessary in starting the kite in light winds to walk briskly to windward. It is almost impossible to describe the means and artifices employed by the skillful operator in managing kites that fly badly, or in working a kite up through strata that have feeble, fitful motion into stronger, steadier currents. Skill of this sort can be acquired only by experience.

If any apparatus is to be carried it is generally tied to the string below the kite or kites after the latter are in good flight and produce a steady and sufficient strain on the string.

The tension on the string varies greatly when only one kite is flying, owing to the tumultuous and ever changing character of the wind. These variations are very much less with two kites in tandem 200 or 300 feet apart. With a tandem of several kites the strain is naturally still more nearly constant.

The manner of flying kites in tandem is also very simple. The kite to be added is first flown on an independent string. A length of from 100 to 150 feet is generally sufficient. The end of this is tied to the main kite line at the desired point. The kite takes care of itself as string is paid out, although in some cases from time to time during its subsequent flight it may foul partly and temporarily with the main line. If there are no points or projections on the second kite

that can be permanently caught on the main line, then the fouled kite will generally soon free itself. It ought to ride above the main line except during momentary lulls of the wind, and often owing to its own lack of perfect symmetry and exact correspondence with other kites or to variations of the wind, it will continuously tend to fly to the right or left. Thus several causes are seen to conspire which tend to make the kite stand free of the main line. There is always, however, in tandem flying, more or less wasted effort in the kites pulling at variance with each other. This will be discussed later.

The work done at the Weather Bureau by Mr. Potter in flying kites prior to the beginning of the investigations by the writer, consisted principally of tests of the Malay or Eddy kite. Although this form of kite is well known a brief description will remove any uncertainty respecting its construction. The frame consists of two sticks of the dimensions shown in Fig. 1. At the point of crossing the sticks are lashed firmly together with waxed string. The cross stick *A B* is bowed backward by means of a string, as shown in the end view, Fig. 2. The depth of the arch is best made about $\frac{1}{16}$ of the arc. A strong cord, *A C B D*, is passed around the frame and securely fastened to the ends of the sticks, so as to produce a perfectly symmetrical figure. The woven wire cord used for hanging pictures, which will not stretch, is much better than any kind of string for this purpose. Paper, calico, cambric, or silk may be used for the covering, which is allowed to bag slightly in order to improve the stability of the kite. The bridle is formed of a piece of stout cord whose ends are tied, respectively, to the point on *C D* at which the sticks cross and to a point near the end, *D*. The length of string should be such that when the bridle is drawn taut and laid over against the surface of the kite it will form the angle *O B D*, Fig. 1. The kite string is attached to the bridle by means of a weaver's knot near the point *B*. The exact position for the best effect can be found only by trial. Mr. Potter sought to improve upon this form of kite by substituting for the bowed cross stick two sticks set so as to form a slight dihedral angle, the effect being to impart a greater degree of stability. With the object of providing a degree of flexibility to the wings of the kite for the purpose of easing off the strains due to gusts of wind, Mr. Potter tried connecting the two cross sticks of a dihedral angle kite by means of a spring. He also inserted a spring of rubber bands in the bridle at *D*, expecting thereby that the after part of the kite would tip up so as to partly spill the wind and ease off the strain of heavy gusts. These attempts to compensate for the gusty character of ordinary winds met with but indifferent success, doubtless owing to the difficulty not only of securing the proper proportions between the strength of the springs and the surface of the kite, but of arranging that the spring should bend or elongate the right amount for a given variation of the total strain. To be effectual it is plain that springs for the above-mentioned purpose must be nicely gauged for both the total strain they must sustain and the flexture or elongation per unit strain.

Two sizes of cable-laid twine were used by Mr. Potter, namely, a heavy twine, $\frac{1}{16}$ of an inch in diameter, weighing about 3.75 pounds per 1,000 feet, and a lighter twine, 0.065 of an inch in diameter, weighing about 1.2 pounds per 1,000 feet. The cord was wound upon a large reel or flanged drum, about 18 inches in diameter. The box within which this drum revolved was firmly bolted to a low table with circular top, but in such a fashion that the box could at any time be revolved in azimuth upon the table top, so as to bring the reel in the proper azimuth according to the direction of the wind. The legs of the table were firmly anchored to the ground. (See further description, page 121.)

These appliances were installed at Mr. Potter's country residence near Washington. The exposure was exceptionally free from obstructions and in many respects very favorable for kite experiments.

When the writer began his investigations of the kite problem in December, 1895, he therefore found much of the necessary apparatus in readiness, and he takes this opportunity to testify to Mr. Potter's skill and experience, and his ability and ingenuity in designing and constructing kites. As will appear in the following pages, Mr. Potter proposed and constructed two or three modified forms of kites, each of which possessed more or less merit, and he had already been successful with the Hargrave kite.

The foregoing brief account sets forth the principal features of the status of the kite work of the Weather Bureau at the time the writer was directed by Professor Moore to investigate the problem of securing meteorological observations in the upper air. What follows aims to set forth the progress made up to July 1, 1896, in developing the kite.

As has already been said the construction and flying of kites on a large scale is purely and only an engineering problem. It is simply a question of stresses and strains, the strength and resistance of materials; a question of the operation and equilibrium of certain well-defined forces. These ideas have been constantly in mind in my efforts to improve and apply the kite to meteorological purposes. The results presented below aim to follow in some sort of logical sequence. Naturally the actual chronological succession of the experiments was often illogical and the results fragmentary in character.

The position a kite takes when poised in mid-air is the result of a condition of equilibrium of five different and wholly independent forces: these are: (1) The pressure of the wind on the kite surfaces. In this I mean to include every wind force whatever, whether exerted upon the extended sustaining surfaces or upon the relatively small ends, sides, edges of the sticks and framework of the kite, the edges of the cloth, wire ties, etc. The skin friction of the wind gliding over the surfaces, if considered, is to be included here also. The resolution of this composite force into its several components and the analysis of their separate effects is a question in itself. (2) The attraction of gravity for the kite. (3) The tension of the string at the kite, that is the restraining pull of the line. (4) The attraction of gravity for the string. (5) The pressure of the wind against the string.

Kite strings.—Inasmuch as the first requisites for kite flying on any extended scale are a convenient reel and plenty of string or line of adequate strength and quality to hold the kites, it will be appropriate to first dispose of some exceedingly important questions relating to the string.

The properties of most importance in determining the fitness of a given material for kite strings are (1) strength, (2) weight, and (3) diameter of the cord, that is, the amount of surface exposed to the pressure of the wind. Generally this last factor—the action of the wind on the string—has been quite ignored or, what is worse, if considered, has been regarded as too small to be of any importance. Such is far from being the case, especially in lofty flights, in which case we must deal with thousands of feet of line.

The size of string generally used in flying kites tandem measures at least one-tenth of an inch in diameter. The area of the longitudinal section of such a string equals a square foot of surface for each 120 feet of running length, that is to say, 44 square feet of surface to the mile. Even though the exterior surface of the string has a rounded form, yet the length we are obliged to deal with in a given case is so great, and a great portion of the string is set at so steep an angle across the direction of the wind, that we must not for a moment assume that the wind pressure on all this surface is too small to be worth considering or that the string can escape being depressed toward the earth by the wind to a very con-

siderable extent. Every one perceives with the eye the very great effects that gravity is able to produce on a long piece of even very fine string, and we all know how great the tension must be to stretch a long piece of string until it is even approximately straight. The actual disturbing force of gravity in operation in such cases is a very feeble one; much feebler, indeed, than the pressure the wind may exert on the same string. If one is skeptical of this statement let him try the following simple but crucial experiment: Take several feet of gilling thread, or similar fine string, such as would be used for flying small kites. Suspend this in a slack loop with the ends on about the same level. If no wind is blowing, the loop will hang in a vertical plane. If, however, the string be suspended where freely exposed to the wind and so that the loop hangs directly across the direction in which the wind blows, the loop will no longer hang in a vertical plane, but will be blown strongly to one side and assume a steeply-inclined position. In fact, with string as light and fine as gilling thread the loop will be blown out quite horizontally with only a gentle breeze. In this experiment the wind and the force of gravity are the only external forces, aside from the reactions at the fixed supports, which affect the position of the string. The wind acts horizontally, gravity acts vertically, and the loop of string takes an inclined position intermediate between the horizontal and vertical. If the two forces are equal, the plane of the loop will be inclined 45° to the horizontal. The observed fact that the string, in many cases, is forced by even moderate winds to a much higher angle than 45° is very significant. It means that the pressure of the wind on each elementary portion of the string is much greater than the weight of an equal portion of the string. The fact that the string in the loop is under very feeble tension, whereas a kite string is under great tension, does not in the least alter the fact that the pressure of the wind on the string is equal to or greater than the attraction of gravity. Furthermore, the fact that the kite string hangs in the direction of the wind, instead of across it, can not annul the effect of the wind, which in such a case is superimposed upon the effect due to gravity, and quite escapes detection by simple methods. In fact, the effect we observe with the eye is commonly regarded as due to gravity alone, whereas it is really the effect of both gravity and the wind. The thoughtful investigator will derive a valuable lesson from a few experiments of the above-described sort with strings of different sizes.

Enough has been said to show that in selecting a kite string the *diameter* of the string may be of even greater importance than its weight.

The judicious selection of the kite string and the adoption of correct methods for uniting its different portions, or for attaching it to the kite, are impossible without a complete knowledge of the strength of the string itself, and of the knots, splices, and other junctions employed.

The testing apparatus described below was hastily improvised for service in the Weather Bureau work, but proves so simple and useful that others may wish to make and employ a similar one in their own work.

Two pieces of square steel, *A*, *B*, Fig. 3, driven through round holes in a flat bar of iron, convert the 4-foot bar into a powerful lever with the knife-edge at *A* for a fulcrum, and the edge at *B* for applying the force. The bent pieces of flat iron, *C*, *D*, form at once the stirrup for transmitting the strain from the knife-edge, *B*, and the jaws within which one end of the string or wire to be tested is grasped. The clamping of the jaws is effected by means of a small independent steel screw-clamp. These latter may be procured from dealers in hardware or tools generally. The support for the lever is most conveniently made of a stick of wood of the form shown and adapted to be attached when required to the side of a bench in such a manner that the long arm of the lever passes obliquely over the top of the bench. The knife-edge, *A*, is arranged to be supported on suitable metal surfaces at the top of the stick. At about 24 inches below the end, *B*, of the lever, a projection is formed in the board. Two iron blocks, *E*, *F*, provided with steady-pins and a clamp, constitute the jaws for grasping the remaining end of a string or wire to be tested. The edge of the projection at *G* has formed within it a narrow slot or rabbet through which the string may pass, while the plates, *E*, *F*, of the clamp abut against the lower face of the projection. This arrangement admits of testing specimens of considerable length. The necessary strain for breaking a specimen is easily produced by hanging any heavy weight upon the long arm of the lever. I have employed, for convenience, one of the Fairbank's 50-pound standard weights. In order to graduate the lever-arm so as to indicate the strain on the specimen in pounds, a rude wooden scale-pan was suspended from the clamp, *C D*, into which was placed objects of known weight up to about 150 pounds, due allowance being made for the pan. From the several positions of the sliding weight, when just balancing the known weights, the complete system of graduation for the lever is accurately determined. By this device strains of something like 350 pounds can be produced upon specimens to be tested. This is quite sufficient for kite work. Tests of the strength of strings, wires, knots, splices, etc., as given hereafter, were all determined by means of the device described above.

To grasp a specimen so that it shall not slip nor yet be impaired in strength, did not prove to be very difficult. The jaws of the clamps are comparatively smooth. To increase the holding of these they were occasionally rubbed with powdered resin. For testing hardened steel pianoforte wires it was necessary in addition to rub the ends of the wire itself with powdered resin, also to form a kink in the extreme ends of the wire and grasp the wire in such a manner that these kinks draw into the sharp angle formed by the slightly divergent jaws of the clamp at one end. With these expedients for grasping the wire excessive clamping was not necessary, and only occasionally would specimens break at the edge of or slightly within the jaws.

The following table contains information respecting the properties of materials that may be employed for kite strings:

TABLE I.—*Properties of materials for kite strings.*

Kind of string or wire.	Diameter.	Weight per 1,000 feet.	Breaking strength.	Relative surface exposed to wind; sq. in., per foot.
	Inch.	*Lbs.*	*Lbs.*	
No. 12 gilling thread	0.032	0.25	30	0.38
Cable-laid twine	0.065	1.20	62	0.78
Do	0.100	3.8	160	1.2
Do	0.150	7.1	300	1.8
Phosphor-bronze wire	0.028	2.5	80	0.34
Aluminum wire	0.0477	*2.15	*48	0.57
Steel piano wire	0.028	2.15	300	0.34

*Computed from general tables; not directly tested.

Tests of silk strings of suitable size for kites would form a valuable addition to this table, but specimens were not available.

From the table we see that aluminum, which many mistakenly regard as a peculiarly useful metal for almost every purpose, is, in fact, the worst material of all for a kite string. It is not only very much heavier, but thicker and more easily broken than fine cable-laid twine. On the other hand steel pianoforte wire is by far the strongest for the same weight and the most slender of any of the materials tested. The

tendency of metallic wire of any kind to kink and give trouble on that account if employed for flying kites is by no means serious and the little extra pains required to prevent kinks and rusting, in the case of steel, is well repaid in the great superiority of steel in every particular. The writer at once substituted wire for string in December, 1895, and its admirable fitness for the purpose is abundantly confirmed by extended experience.

The steel piano wire selected for the Weather Bureau work measured about 0.028 of an inch in diameter. This is the size generally employed for deep-sea sounding purposes. In the use of wire a question of first importance is, how shall it be spliced? In my early work the wire was spliced according to the recommendations of authorities on deep-sea sounding. Disastrous results ensued from the parting of the wire in the splices. Thereupon a thorough investigation of the strength of splices was made by means of which a form of splice was evolved that it has been impossible to break. The single wire either side of the splice will always break first. Fig. 4 shows a common form of soldered splice, recommended and used for splicing wire employed in deep-sea sounding. This is a bad form of splice and will, in almost every case, break in the middle and at a less strain than required to break the wire. The only part of the splice that is at all effectual in resisting strain is the short intertwisted portion in the middle. It is plain that throughout the whole portion, *a*, *b*, where one wire is coiled closely around the other which remains straight, practically the whole strain is carried, and necessarily must be almost wholly carried by the straight core wire. The solder of the splice can carry only a little of the strain. The coiled wire in the portion, *a*, *b*, is, therefore, so much wasted material. The mechanical principles involved in splicing a wire by twisting requires *that each part be twisted around a common axis.* It is wrong to twist one part wholly around the other which remains straight. According to this principle the splice shown in Fig. 4 is evolved into the splice shown in Fig. 5 by discarding the portion *a*, *b*, and elongating the middle portion. Although not necessary for strength it will generally be well to take one turn of the wire around the main part at each end of the splice and taper down the point somewhat by filing. This will lessen the danger of damaging the splice in case it drags across the edge of the reel or some rough hard object, and the splice will perhaps pass more easily through the hand or through oily cloths which must sometimes be employed to prevent rusting. In not a single case have soldered splices of this formation ranging from 2 to 2½ inches, extreme length, been broken. Fifteen specimen splices were tested. The wire outside of the splice was broken in every case at average strains of about 225 pounds. Minimum strength, 210 pounds; maximum strength, 235 pounds. The solder may be applied to the splice with an ordinary soldering iron, treating the splice first with soldering acid in the usual way. A better plan[1] is to submerge the splice in a small quantity of molten solder contained in a shallow groove in a block of wood. By this method there is little danger of overheating the wire and impairing its temper. Those familiar with soldering need not be told that the completed splice must be thoroughly washed with clean or alkaline water so that every trace of the soldering acid is removed, otherwise excessive rusting of the wire will quickly ensue. Keeping the wire thoroughly coated with a film of oil has thus far been sufficient to prevent rusting. The wire has, however, never been exposed much to rain and damp.

Inasmuch as the security and strength of the splice described above depends upon *the wires being evenly and uniformly twisted each about a common axis*, the twisting is best effected by using simple tools, such as shown in Figs. 6 and 7. The wires to be spliced are clamped in the small block of brass, *A*, having two shallow converging saw cuts as indicated by the dotted lines. The block is fitted with a brass plate covering the slots and kept in position by steady pins, *a*, *a*. The cover plate is made to clamp the wire in the shallow slots by means of a common machinist's hand vise, not shown. The brass block, *B*, also cut with slots converging the same as in *A*, serves for twisting the wires. The cover on the block, *B*, simply confines the wires to the slots without clamping them. Rotating the block, *B*, on its longitudinal axis twists the wires as evenly as can be desired. If the free ends of the wire are to be turned once closely around the main wire, this is effected by means of a tool shown in Fig. 7, which scarcely needs explanation. The splice is finished by nipping off the extreme free ends of the wires close down to the main wire and, if desired, the ends may be further touched up, before soldering, by careful filing to the form shown in Fig. 5.

While steel wire is the best material for the kite line, yet it is not convenient to form a continuous wire connection up to the kite, especially during the experimental stage of the work when alterations in the points and manner of attaching the wire to the kite are necessary. String is peculiarly adapted for such connecting purposes, on account of its flexibility and the facility with which it can be tied in knots. Twine of suitable strength has, therefore, been employed for the bridles of the kites. To the bridle is also attached a short length (from 4 to 6 feet) of twine which will hereafter be designated the "stray line." By this arrangement of bridle and stray line any desired adjustment and alteration of the bridle attachment may be made by means of knots hereafter to be described. The stray line provides means for readily attaching a kite to, or detaching it from, the wire, still preserving any desired bridle adjustment.

Correct engineering practice requires that we inform ourselves definitely concerning the strength of every important member of a structure. Therefore, when we employ string in the bridles and the stray lines of our kites we must definitely ascertain their strength, especially if tied and knotted together.

The question as to how well and conveniently knots answer their purpose, and to what degree they constitute a weak spot in the string containing them, is a very interesting one for investigation. Although string is used in the Weather Bureau work in only a subordinate capacity, yet a number of tests of strings united by different kinds of knots were made, and as the results may prove useful to those who employ string instead of wire for flying kites they are given in the table below. All the tests were made on new cord that had never been used. The cord was a hard twisted cable-laid twine, which measured between 0.105 and 0.115 of an inch in diameter and weighed in the slack cord 4.1 lbs. per 1,000 feet.

TABLE II.—*Strengths of cords united by various knots.*

No. of test.	Kind.									
	1	2	3	4	5	6	7	8	9	10
	Double overhand knot.	Sheet bend or weavers' knot.	Sheet bend, double turn.	Square knot.	Fisherman's knot.	Interlaced overhand knot.	Interlaced figure of 8 knot.	Carrick's bend.	Bowline bebd.	Cord unknotted.
1	110	118	160	158	172	143	185	179	172	171
2	138	127	110	174	173	156	138	175	187	180
3	150	118	146	158	154	145	149	175	198	165
4	130	125	160	110	140	174	160	164	178	167
5	135	112	131	138	133	171	150	182	165	169
6	.....	.....	.....	168	.....	.....	140	.....	191	182
7	.....	.....	.....	163	.....	.....	162	.....	198	172
8	.....	.....	.....	143	.....	.....	170	.....	202	160
9	.....	.....	.....	.....	.....	.....	150	.....	190	194
10	.....	.....	.....	.....	.....	.....	135	.....	185	198

[1] Described in Deep-Sea Sounding and Dredging, Sigsbee. U. S. Coast and Geodetic Survey, 1880.

The exact structure of the knots will be understood from the illustrations, Figs. 8 to 16. The so-called "double overhand knot" was tested because it is so commonly used by a novice for uniting two strings, and because it has often been employed in flying kites tandem for the purpose of forming a loop in the main line, as shown at *a*, Fig. 8. It is a very bad knot for the purpose. The "weavers' knot" or "sheet bend" is very small and compact, but cuts upon itself badly and is weak. The "square knot" is much better, but is not always proof against slipping a little, which, if it occurs under considerable strain is almost certain to result in a break at the knot. The tendency to slip is almost wholly removed by drawing the parts taut in such form that the loose ends stand well out at an angle to the main parts. Do not tighten up the knot while the loose ends are held parallel with the main parts. Fig. 11 shows the knot correctly tied.

It seems there may be some difference in the strength depending upon whether a knot is tied *with* or *against* the "lay" of the cord. I have not, however, been able to definitely discover a difference of this sort.

The "fisherman's knot"[1] called also "surgeon's knot" by Eddy and Fergusson of Blue Hill, is compact and comparatively strong. The "interlaced overhand knot" is formed by tying a simple knot loosely on the end of one string and passing the end of the other string through and around the knot in the opposite sense, as shown in Fig. 13. The "interlaced figure of 8 knot" is formed in a precisely similar manner, based on the knot shown in Fig. 14. Each of the foregoing knots draws down exceedingly compact and hard, and it is almost impossible to untie them after being strained, especially the two latter. This is also true of the "Carrick's bend." The latter, however, is designed to unite heavy ropes, hawsers, etc., and in such cases the loose ends of the knot are "stopped" or lashed to the main parts, and in such condition the knot can not jam. Occasionally the knots enumerated from 1 to 8 in the table will sustain a strain that will break the cord, but such was found to be rather the exception and generally the string appeared to break at a weak point.

The king of all the knots, however, is the "bowline knot," not only because of its remarkable strength, which is such that the cord itself will break at a high strain while the knot holds in the majority of cases, but from the adaptability of the knot to a variety of purposes and from the fact that it never slips and can be untied with the least possible effort, even after sustaining excessive strains. Fig. 16 shows the manner of uniting cords by this knot, and although for this purpose it is less compact and neat than other knots, it is exceedingly trustworthy and can be depended upon to nearly or quite the full strength of the cord. It has no equal for uniting two cords differing in size. It will never break at the point, *a*, which I was at first inclined to regard as a weak spot. This knot is so excellent that its use is strongly recommended. The successive steps in a simple manner of tying it will be given, as the beginner may find some difficulty in forming the knot easily with no other guide than Fig. 16. The first step is to form a simple overhand knot, held as shown in Fig. 17; by a dexterous turn of the fingers the knot is brought to the form shown in Fig. 18, and finished by passing the end behind the main part and through the eye, as shown in Fig. 16. The act of tying the knot is one continuous motion. In drawing the knot taut it is not necessary or desirable to tighten up the crown (*a*, Fig. 16,) of the knot very much. To untie the knot the crown is first drawn over in a manner to free the knot, whereupon the whole is easily undone.

As already mentioned, when wire is used as the kite line, string need be employed only for bridles, stray lines, and other short connectors. The end of the wire is formed into a small eye which incloses an eyelet, as shown in Fig. 19. The string from the kite is attached to this eyelet by means of a bowline knot. A number of actual tests demonstrated the superiority of this knot for forming this junction.

While discussing knots it will be well to dispose of the matter and describe the manner of tying the bridle to the kite sticks and of adjustably attaching the stray lines to the bridle.

Fig. 20 illustrates both these connections. The clove-hitch reinforced by one or two half hitches of the loose end of the string around the main part of the bridle seems to answer every purpose for securing the bridle to the kite stick. I have been unable to discover a more excellent method of attaching the stray line to the bridle than by means of a bowline knot, the loop of which forms with the bridle a square knot, *a*, Fig. 20. The knot cannot slip in use and even if excessively strained it can be loosened with the slightest effort and in such a manner that the point of attachment can be easily shifted by any definite and precise amount. The simplest way of forming the square knot between the loop of the bowline and the bridle is to tie the bowline first, independent of the bridle, then pass the loop of the bowline around the bridle and draw the end of the stray line, which will generally be free, through the loop of the bowline, forming the knot shown in Fig. 21. This is easily converted into the square knot shown in Fig. 20. The complete arrangements of bridle and stray line was repeatedly tested with the result that the arrangement was fully as strong at every part as the cord itself.

It still remains to describe what methods have been developed for attaching kites in tandem. Where string is employed for the kite line a simple loop knot, *a*, Fig. 8, may be formed at any point desired. As already pointed out, and as shown in Table II, if this knot is tied in the manner figured, the strength of the line is thereby weakened in a very serious manner. As it is plainly very bad practice to impair the strength of hundreds of feet of strong cord simply by one or more weak knots, it is also plain that those who employ string for the kite line need a method much better than that just described for forming a loop or other device by which the following kites of a tandem may be attached to the main line. The importance of this little matter is still more apparent when we consider that if a single one of these knots or loops forms a point in the line which is 33 per cent weaker than the weakest place in the cord itself, a condition which the tests show is easily possible, then to safely sustain a given strain the entire length of line involved must be 33 per cent stronger, that is, approximately 33 per cent heavier than would be required if the strength of the cord was not thus impaired by loops. The weight and size of the string are of such vital importance in flying kites to extremely great elevations that bad practice of the kind just pointed out can not for a moment be tolerated.

The foregoing remarks apply equally in determining what arrangements will be admissible for attaching tandem kites to wire. Every device that impairs the normal strength of the wire must be ruled out. In speaking of the several kites forming a tandem it will be convenient to designate the top kite as the leader, or pilot, kite. The others may be called subordinate kites or followers, and the line of wire leading up from the reel will be called the main wire, or main line, while the relatively short branches leading up to the subordinate kites will be spoken of as secondary lines.

An angle in the continuity of the main line is formed at any point at which a secondary line is attached. This angle varies from moment to moment with the ever changing wind forces on the different kites. If wire is used and flexibility is not provided for at the point of attachment, or other means adopted to obviate ill effects from bending, then it is only a question of time before the strength of the wire will be

[1] Chamber's Encyclopedia. New edition, New York, 1892.

impaired. The writer has not been able to conceive of a clamp for this purpose that is entirely free from serious objections. After discarding loops of string firmly lashed with waxed twine to the wire he has, however, adopted the eyelet arrangement shown in Fig. 22. In addition to forming a perfectly flexible point of attachment, the strength of the junction, with double twisted wires either side of the eyelet, is stronger than the wire itself, as shown by actual tests.

Steel wire of the same size as the main kite wire is also employed for the secondary lines. The length ranges from 100 to 150 feet, with an eyelet in each end, as shown in Fig. 19.

The connection of the secondary line to the intermediate eyelet of the main line is made by a short piece of twine tied to the eyelets by means of the bowline knot.

The intermediate eyelets put into the main line are too small to present any difficulty in stowing away upon the reel. The only objection to them hitherto found is that the points at which attachment to the main line is possible are fixed and predetermined, and can not be chosen, as is sometimes desired.

The relative merits of several small kites flown tandem as contrasted with spreading the same amount of surface in one or two large kites, will be analytically discussed later. It may be stated here, however, that although the tension on the line becomes more and more steady the greater the number of kites in tandem, yet the gain in steadiness when more than two or three kites are employed is entirely unimportant, and, as will be shown hereafter, a large kite is more effective than an equal surface in small kites flown tandem. Based on these considerations the practice at the Weather Bureau has been to fly but a small number of kites tandem, and the use of eyelets at fixed points in the main wire has been generally satisfactory.

One further difficulty has presented itself in the use of wire, and for which thus far no satisfactory solution has been reached, namely; if the wire is in a state of internal strain, such that when stretched it tends to rotate on its longitudinal axis (and if no provision of a swivel or other device has been made for relieving this twisting strain), then under certain conditions of moderate strain, and at moments when the main and a secondary line take nearly coincident directions, the two may intertwist around each other for a length of many inches, but be again violently untwisted more or less completely when a condition of stronger winds and heavier strains prevail. It is needless to say that such action threatens to impair the strength of the line.

Swivels are believed to be of no avail to obviate this difficulty. In the first place they must be capable of resisting a strain at least as great as the ultimate strength of the wire. Made in the ordinary way the friction, owing to heavy strains that would occur in use, would wholly prevent their effectual action. A ball-bearing swivel would, we believe, not be much better. Moreover, even supposing an effective swivel available, as rotation of the kite wire can not take place across the angle formed at the point of attachment of a subordinate kite of a tandem, it would be necessary to provide a swivel at each point of attachment of a secondary line. The winding of bulky ball-bearing swivels on the reel presents a serious objection to their introduction.

From the foregoing statements and data respecting the materials and arrangements which form the kite line, it will be seen that the maximum of strength with the minimum of weight and surface exposed to wind action is approximately attained by the use of steel wire. With the arrangements recommended, there will be a uniform strength throughout, with no inherently weak points of construction nor portions of unnecessary strength, and, therefore, unnecessary weight. The main wire is expected to withstand the united pull of several kites, and must, therefore, be stronger than the bridles, stray lines, etc. These latter, when made of the cable-laid twine employed in making the tests given in Table II, are, as shown therein, stronger in proportion to the strains they must sustain than the wire itself. The excess of material and weight involved in this excess of strength is very small, however, and of no importance. For small-sized kites smaller twine may be safely employed.

The following table contains the results of tests upon splices, eyelets, and other members that go to form the line by which a kite or tandem of kites is anchored to the earth:

TABLE III.—*Ultimate breaking strength of members of kite line.*

Number of test.	Steel wire.	Marvin splice.	Eyelet, Fig. 19.	String tied in eyelet, Fig. 19.	Stray line and bridle.
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
1	229	225	206	207	184
2	230	210	216	185	194
3	219	225	.....	170	188
4	250	228	.....	181	198
5	223	223	.....	183	184
6	213	225	.....	181	194
7	220	229	.....	.....	161
8	.....	229	.....	.....	191
9	.....	210	.....	.....	201
10	.....	236	.....	.....	302
11	.....	225	.....	.....	305
12	.....	233	.....	.....	300
13	.....	233	.....	.....	194
14	.....	231	.....	.....	207
15	.....	231	.....	.....	194

The reel.—The reel required for the proper management of either the kite wire or string will need little or no description, except in respect to particular adaptations, and especially in regard to the means employed for measuring the total length of the wire or string and the length paid out to the kite at any time.

It will frequently be necessary, when flying kites in light winds, to keep the kite afloat by reeling in the wire more or less rapidly. For this purpose experience has shown that the circumference of the drum of wire or string should be scarcely less than 5 feet. A much larger drum than this, where it is to be operated by hand, will prove difficult or, at least, inconvenient to manage when the wire is under considerable strain. Moreover, it is desirable to avoid the use of multiplying gear, such as would be required with very large drums in order to secure adequate power for the purpose of winding in kites by hand when exerting strong pulls. A drum 18 inches in diameter operated by two hand cranks, each 15 inches long, represents something over a threefold reduction, which in the large majority of cases will prove ample.

A very interesting phenomenon connected with flying kites with wire is the electrification of the wire. To be able to observe effects of this sort, it is necessary that the reel of wire be insulated, which is accomplished satisfactorily if the drum is made of heavily shellacked wood. The core of the drum must be made very strong, to avoid the enormous crushing pressure incident to winding in turn after turn of the wire under heavy strain. For the same reason the flanges must be comparatively thick, to prevent flexure, and strongly riveted to the core, to prevent being forced asunder.

Fig. 23 shows the second reel employed in the Weather Bureau work. Our first reel was only 12 inches in diameter, and proved to be too small, and the flanges were too weak. About 10,000 feet of wire forms a layer on the large reel a little over 0.4 of an inch deep.

The inside end of the wire on the reel comes through the flange to the button, *a*, which can be electrically connected to the earth by the switch, *A*.

For the purpose of indicating the number of rotations

made by the reel the axis is provided with a suitable worm, arranged to actuate the dial mechanism of an ordinary anemometer. The length of wire corresponding to any particular dial reading is obtained by means of a numerical table, the computation of which will be explained later.

The carriage upon which this reel is mounted is shown in Fig. 24. It is the same carriage employed by Mr. Potter in his work with string. A central bolt confines the box, *A*, to the low table, *T*, but permits rotation thereon, aided further by castors near the four corners.

The rope brake, *b*, Fig. 24, which passes almost completely around the reel in a friction score, or groove, of the flange, serves perfectly to control the rapid paying out of wire, the necessary restraint being produced by tightening gently the slack end of the rope at *c*. The reel being of wood, and, therefore, but a poor conductor of heat, temperatures sufficient to scorch the rope and wood in the groove have sometimes resulted from the great friction, but no serious difficulty has been experienced on this account.

When wire is paying out under control of the brake the rapid rotation of the hand cranks is somewhat objectionable. To provide them with ratchet connections so that they may remain stationary when the reel is unwinding, as is done in some forms of reels for deep-sea sounding purpose, is not altogether desirable in kite work, as the strain on the wire is sometimes exceedingly variable. Moreover, a rigid handle is most trustworthy in cases where it is necessary to control the reel by the handle for both winding and unwinding.

A common and well known form of spring balance has been generally employed to ascertain the tension produced by the kites. One method has been to hook the dynamometer directly to one of the crank handles, fixing it in such a position that the restraint is exerted in a direction closely at right angles to the crank arm. This method, which is preferred from the fact that the reel can be quickly disengaged from any restraint should emergency demand, requires that a reduction factor be applied to the observed dynamometer reading, depending upon the ratio between the crank arm and drum radius at the point from which the wire draws. The ratio is always known for any given length of wire out, so that the reduction presents no difficulty.

A second method, which measures the tension directly, consists in arranging the dynamometer to draw over the surface of the drum itself by means of a cord wound partly over the outer layers of wire, as shown at Fig. 25.

When reeling in distant kites the wire is guided wholly by shifting the carriage of the reel slightly in azimuth, as may be required from time to time. We have found the direction of the wire to remain so nearly constant that this means of control is ample, and it further avoids any necessity of touching the wire with the hands, which is liable to induce rust. Near the close of the operation, when the kites are but 100 or 200 feet distant, it may be necessary to guide the wire by hand. As a precaution against rust, the wire in reeling in is sometimes oiled by causing it to draw through a piece of folded cloth held in the hand and saturated with oil.

The evaluation of the readings of the dial showing the number of revolutions of the reel is effected once for all by accurately measuring in sections a long length of wire as it is wound upon the reel. In the case of the reel under discussion the length of wire was measured by causing it to pass around a disk having a known circumference and which revolved with the greatest freedom. The disk, in fact, was mounted upon the spindle of an anemometer, the dial readings of which indicated the number of turns of the disk. The tension of the wire was regulated by causing it to pass between a friction plate of wood so arranged as to guide the wire in its passage to and from the measuring disk and at the same time prevent any slipping or shifting of the wire on the grooved periphery of the disk. The apparatus is shown diagrammatically in Fig. 26. The observations for the measurement of the wire are of the following nature: The end of the wire being passed around the disk and secured to the reel, note is made of the dial readings to the nearest tenth of a revolution of the disk and reel, respectively. Approximate chalk mark subdivisions answer for the fractions of revolutions. When fifty turns of wire are wound on the reel, readings of the dials are again noted, and so on. In addition to noting the readings for each fifty turns of the wire, readings are also recorded at the end of each full layer. In winding the wire on the reel, originally, it is not difficult to lay it on very evenly for a depth of seven or eight layers, but splices and other irregularities break up smooth winding, and after a time definite layers cannot be formed. It is impracticable, however, to guide the wire in even layers when reeling in kites. By a preliminary weighing of several of the sections of wire wound on, and by accurate determination of their respective weights per unit length obtained by measuring and weighing short samples, the above-described series of observation may be made to suffice first, for determining the exact periphery of the measuring disk and then the length of wire corresponding to any number of turns of the reel. In this case it will of course be necessary (*a*) to note the dial readings at the times the splices between sections pass on to the reel, and (*b*) to make slight corrections for the few inches of the wire used in forming the splices.

To show what variation may be expected in different portions of wire, nominally of the same size, and to present data from which an idea of the accuracy attained in measuring the length of the wire by the above-described means, the following observations are quoted:

TABLE IV.—*Weight per unit length of samples of steel music wire. Nominal diameter of wire,* 0.028 *inch.*

Sample.	Length.	Weight.	Weight per foot.	Whole coil.		Periphery of disk.
				Weight.	Length.	
	Feet.	*Grms.*	*Grms.*	*Grms.*	*Feet.*	*Feet.*
1	27.335	27.343	1.0003	1248.9	1251.0	3.1511
2	18.445	18.370	.9959	2240.0	2244.0	3.1558
3	23.057	21.966	.9527	2241.0	2335.2	3.1433
4	12.396	11.956	.9666			
5	29.989	28.996	.9666	2286.2	2368.6	3.1700
6	11.696	11.272	.9637			
7	30.703	29.618	.9647	2239.3	2316.7	3.1502
8	12.084	11.655	.9685			

Mean periphery, 3.1541.

NOTE.—Samples joined by brackets were cut from outer and inner ends of the same coil.

A layer of wire on the large reel contained, on the average, about 155 turns. All the observations in a single layer were combined as an average for that layer. The law of increase of the periphery of the reel, with successive layers of wire is practically a linear law. A ready and sufficiently exact solution of the observation equations is therefore obtained by aid of a diagram. The table, V, contains the results for the large reel.

There is doubtless a slight difference in the average length per revolution depending on whether the wire is wound in smooth layers or not, but I have been unable to definitely evaluate any difference of this sort, notwithstanding that what I may call the calibration measurements agree and harmonize among themselves with considerable precision. Moreover, in using the wire, several thousand feet may be unwound from smooth layers and wound on irregularly, and it will be found the dials come back to the starting point very satisfactorily. Differences of a fraction of one per cent may be due to differences of tension.

TABLE V.—*Observed and computed length of wire of large reel.*

Layer.	Turns of reel.	Total length by measuring disk.	Tabulated length.	Difference, obs. − table.	
		Feet.	*Feet.*	*Feet.*	
*	31	151.5	151.4	+ 0.1	* Outside fractional layer.
....	331	1,614.7	1,614.0	+ 0.7	The extreme outside layers were not distinguishable in the observations.
13	481	2,342.3	2,342.0	+ 0.3	
12	631	3,067.7	3,067.8	− 0.1	
11	743	3,608.2	3,608.2	0.0	
10	931	4,512.6	4,513.0	− 0.4	
9	1,092	5,284.5	5,285.2	− 0.7	
8	1,244	6,011.0	6,011.8	− 0.8	
7	1,395	6,731.8	6,731.5	+ 0.3	From the eighth layer, to and including the first the winding is in smooth layers.
6	1,547	7,454.0	7,453.7	+ 0.3	
5	1,696	8,159.6	8,159.6	0.0	
4	1,831	8,797.8	8,797.2	+ 0.6	
3	2,011	9,647.0	9,644.8	+ 2.2	
2	2,170	10,394.7	10,390.9	+ 3.8	
1	2,331	11,146.6	11,144.1	+ 2.5	

[To be continued in May REVIEW.]

NOTES BY THE EDITOR.

MEXICAN CLIMATOLOGICAL DATA.

In order to extend the isobars and isotherms southward so that the students of weather, climate and storms in the United States may properly appreciate the influence of the conditions that prevail over Mexico the Editor has compiled the following table from the Boletina Mensual for March, 1896, as published by the Central Meteorological Observatory of Mexico. The data there given in metric measures have, of course, been converted into English measures. The barometeric means are as given by mercurial barometers under the influence of local gravity and thereíore need reductions to standard gravity, depending upon both latitude and altitude; the influence of the latter is rather uncertain, but that of the former is well known. For the sake of conformity with the other data published in this REVIEW these corrections for local gravity have not been applied. The Editor regrets that the table for April, 1896, can not also appear in this number of the MONTHLY WEATHER REVIEW.

Mexican data for March, 1896.

Stations.	Altitude.	Mean barometer.	Mean temperature.	Relative humidity.	Precipitation.	Prevailing direction.	
						Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	%	*Inch.*		
Aguascalientes	6,112.3	.....	.....	.....	.....	.....	.....
Campeche	40.4	.....	.....	.....	.....	.....	.....
Colima (Seminario)	.....	28.28	73.9	62	0.00	ssw.	w.
Colima	1,291.7	.....	76.3	.....	.....	.....	.....
Culiacan	112.2	.....	.....	.....	.....	.....	.....
Guadalajara (H. de B.)	5,141.2	.....	.....	.....	.....	.....	.....
Guadalajara (Obs. S. Est.)	5,188.0	.....	.....	.....	.....	.....	.....
Guanajuato	6,761.3	23.65	66.2	30	T.	sw.	sw.
Jalapa	4,757.3	25.53	64.8	60	2.69	nnw.	.....
Lagos (Liceo Guerra)	6,274.5	24.12	65.5	33	0.02	sw.	sw.
Leon	5,901.0	24.26	66.0	28	T.	sw.	w.
Mazatlan	24.6	29.94	72.9	77	T.	nw.	sw.
Merida	50.2	29.94	77.2	60	0.00	ese.	n.
Mexico (Obs. Cent.)	7,488.7	23.05	61.5	42	0.04	n.	sw.
Mexico (E. N. de S.)	7,480.5	23.03	61.7	49	0.04	nw.	.....
Morelia (Seminario)	6,401.0	23.94	62.2	44	T.	ssw.	w.
Oaxaca	5,164.4	25.05	70.7	52	1.45	w.	sw.
Pabellon	6,312.4	23.96	66.0	36	T.	sw.	sw.
Pachuca	7,956.3	22.61	58.1	60	0.13	nne.	.....
Progreso	.....	.....	.....	.....	.....	.....	.....
Puebla (Col. d'Est.)	7,118.2	.....	.....	.....	.....	.....	.....
Puebla (Col. Cat.)	7,112.0	23.32	63.7	45	0.20	.....	.....
Queretaro	6,069.7	24.16	64.2	39	0.03	e.	nw.
Real del Monte (E. de H.)	9,095.2	.....	.....	.....	.....	.....	.....
Saltillo (Col. S. Juan)	5,376.7	24.81	64.6	57	0.00	s.	sw.
San Luis Potosi	6,201.9	24.10	64.8	49	0.06	e.	w.
Silao	6,063.1	.....	.....	.....	.....	.....	.....
Tacambaro	.....	.....	.....	.....	.....	.....	.....
Tacubaya (Obs. Nac.)	7,630.2	22.94	60.1	44	0.06	nw.	.....
Tampico (Hos. Mil.)	.....	.....	.....	.....	.....	.....	.....
Tehuacan	5,152.8	.....	.....	.....	.....	.....	.....
Toluca	8,612.4	21.80	60.8	41	0.14	w.	wsw.
Trejo (Hac. Silao, Gto.)	.....	.....	.....	.....	.....	.....	.....
Trinidad (near Leon)	6,010.1	.....	.....	.....	.....	.....	.....
Veracruz	47.2	.....	.....	.....	.....	.....	.....
Zacatecas	8,015.2	22.52	60.4	34	0.00	sw.	s.
Zapotlan (Seminario)	5,124.8	25.04	68.5	.....	0.00	se.	sw.

METEOROLOGICAL TABLES.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

For text descriptive of these tables and charts see p. 16.

TABLE I.—*Climatological data for Weather Bureau Stations, April, 1896.*

Stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure in inches.			Temperature of the air, in degrees Fahrenheit.								Humidity and precipitation.					Wind.				Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Monthly temperature data since opening station.			
			Mean pressure, 8 a. m. and 8 p. m. +2.	Mean reduced.	Departure from normal.	Mean max. and min. +2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.				Absolute maximum.	Year.	Absolute minimum.	Year.
New England.						44.2	+ 1.2										1.22	— 2.0												
Eastport	76	24	29.98	30.07	+ .18	39.6	+ 1.0	67	20	46	22	8	33	26	38	66	0.86	— 2.2	8	7,762	n.	48	e.	2	9	13	8	5.6	71	1886	2	1874
Portland, Me	103	25	29.97	30.08	+ .16	43.4	+ 1.8	77	15	51	24	3	36	44	35	76	1.65	— 1.4	9	5,549	s.	30	nw.	4	9	8	13	6.0	78	1881	12	1874
Northfield	872	10	29.16	30.12	+ .16	42.1	+ 3.4	81	16	54	14	3	30	46	33	73	0.51	- 1.7	8	6,029	s.	32	nw.	4	9	11	10	5.5	81	1896	— 1	1887
Boston	125	26	29.98	30.12	+ .19	47.2	+ 2.1	84	13	55	25	4	39	41	33	62	1.56	— 1.9	8	8,260	e.	40	w.	3	13	9	8	4.7	85	1872	11	1874
Nantucket	14	10	30.10	30.11	+ .15	42.8	+ 0.6	70	15	49	25	4	37	28	36	79	0.62	— 3.0	9	8,850	ne.	40	n.	22	9	9	12	6.0	70	1896	22	1894
Woods Hole	.....	19	.....	.....	.....	43.0	— 1.3	69	20	49	22	4	37	25	.....	.....	1.33	— 2.7	7	9,707	sw.	44	nw.	4	15	10	5	3.4	69	1896	17	1874
Vineyard Haven	.....	10	.....	.....	.....	46.9	+ 0.3	79	16	55	26	4	39	34	.....	.....	1.37	— 1.1	10	.....	sw.	.....	.....	...	8	14	8	....	79	1896	22	1887
Block Island	37	16	30.10	30.13	+ .18	43.7	— 0.1	71	18	50	26	4	38	27	38	81	1.73	— 1.7	9	10,962	e.	47	ne.	8	4	22	4	5.4	71	1896	25	1887
Narragansett Pier	.....	15	.....	.....	.....	45.6	+ 1.4	79	17	54	24	*	37	31	.....	.....	1.38	— 1.9	7	.....	sw.	.....	.....	...	22	2	6	....	81	1886	12	1894
New Haven	107	24	30.00	30.12	+ .15	48.2	+ 2.4	85	16	57	22	4	39	35	36	66	1.19	— 2.3	7	6,663	s.	45	w.	3	14	9	7	4.4	85	1896	16	1874
Mid. Atlan. States.						55.7	+ 3.8										1.29	— 2.2												
Albany	85	23	30.08	30.12	+ .16	50.2	+ 3.5	88	16	61	22	4	40	38	40	73	0.98	— 1.5	7	5,758	s.	36	w.	3	13	9	8	4.9	88	1896	13	1874
New York	314	26	29.79	30.13	+ .15	50.4	+ 1.7	90	18	58	23	4	42	38	40	74	1.24	— 2.1	6	9,554	nw.	52	nw.	4	11	13	6	5.1	90	1896	20	1874
Harrisburg	377	8	29.73	30.15	+ .15	54.4	+ 4.3	92	*	63	24	3	46	36	44	73	1.19	— 2.3	9	5,919	e.	42	nw.	3	10	8	12	5.7	92	1896	24	1896
Philadelphia	117	26	30.02	30.14	+ .15	55.2	+ 4.6	93	18	64	28	4	46	32	41	65	1.19	— 1.8	9	7,417	nw.	36	nw.	3	9	14	7	5.3	93	1896	18	1874
Baltimore	142	26	29.98	30.14	+ .14	56.6	+ 3.5	94	18	65	31	4	48	32	43	63	1.44	— 2.0	8	6,056	se.	36	w.	3	9	12	9	5.4	94	1896	23	1875
Washington	112	26	30.04	30.16	+ .17	56.6	+ 3.8	93	18	66	28	9	47	43	43	66	1.07	— 2.3	9	5,446	nw.	36	nw.	3	15	8	7	4.1	93	1896	22	1875
Cape Henry	.....	23	.....	.....	.....	58.1	+ 4.3	96	19	66	34	5	50	40	.....	.....	1.73	— 2.8	9	.....	s.	.....	.....	...	12	8	10	....	96	1896	28	1875
Lynchburg	685	25	29.42	30.15	+ .15	60.2	+ 4.4	95	18	71	30	8	49	42	50	74	1.61	— 1.8	6	3,534	nw.	34	nw.	3	12	10	8	4.8	95	1896	25	1881
Norfolk	57	26	30.10	30.16	+ .16	59.9	+ 3.8	95	18	70	35	4	50	36	51	79	1.18	— 2.9	8	6,373	ne.	35	nw.	3	13	9	8	4.8	95	1896	27	*
S. Atlantic States.						65.1	+ 3.4										1.42	— 2.2												
Charlotte	773	18	29.34	30.15	+ .14	64.8	+ 5.0	94	17	76	34	3	54	36	47	60	1.50	— 1.6	8	5,127	s.	28	w.	2	20	7	3	3.5	94	1896	26	1891
Hatteras	11	16	30.17	30.18	+ .18	59.1	+ 1.8	73	28	64	40	8	54	19	52	82	1.71	— 3.0	8	11,013	sw.	40	n.	7	17	8	5	3.8	76	1896	31	1881
Kittyhawk	9	22	30.16	30.17	+ .18	58.4	+ 3.6	89	19	66	38	5	51	33	51	82	2.04	— 2.4	9	10,789	sw.	47	n.	7	19	4	7	3.6	92	1888	29	1881
Raleigh	388	10	29.75	30.17	+ .16	63.6	+ 6.1	95	18	74	31	8	53	36	46	60	1.50	— 1.0	7	4,736	s.	27	nw.	21	15	11	4	4.0	95	1896	30	1892
Wilmington	78	26	30.12	30.20	+ .19	63.7	+ 2.4	89	21	73	38	8	54	29	52	73	0.64	— 2.3	6	7,148	sw.	32	nw.	3	17	12	1	3.1	90	1880	28	1875
Charleston	52	26	30.17	30.22	+ .19	66.4	+ 2.2	89	21	73	44	3	59	23	57	79	0.71	— 2.9	4	6,902	sw.	30	ne.	8	16	13	1	3.1	89	1896	32	1881
Columbia	.....	9	.....	.....	.....	68.2	+ 5.2	96	18	81	36	3	56	35	.....	.....	0.95	— 2.1	4	.....	sw.	.....	.....	...	13	15	2	....	96	1896	38	1891
Augusta	180	25	29.90	30.18	+ .18	68.2	+ 3.9	93	17	80	39	3	57	34	52	65	2.71	— 0.6	9	4,270	se.	46	nw.	24	17	8	5	3.7	93	*	29	1887
Savannah	98	26	30.10	30.21	+ .16	68.6	+ 2.5	90	*	78	42	3	59	28	57	73	1.51	— 2.0	5	6,674	s.	36	nw.	2	17	8	5	4.1	90	1896	33	1881
Jacksonville	43	25	30.15	30.20	+ .16	70.0	+ 1.2	92	24	80	43	3	60	29	58	72	0.49	— 2.4	2	4,727	sw.	25	ne.	8	17	11	2	2.9	92	1896	34	1891
Florida Peninsula.						72.7	— 0.9										0.84	— 1.0												
Jupiter	28	9	30.15	30.18	+ .14	72.0	— 1.8	85	2	78	51	4	66	20	61	72	1.59	— 0.8	3	7,993	e.	28	n.	3	13	14	3	4.0	88	*	39	1891
Key West	22	26	30.14	30.16	+ .12	75.0	— 1.0	83	27	79	66	3	71	12	64	71	0.08	— 1.1	2	8,367	e.	31	n.	3	14	14	2	4.1	91	1881	54	1891
Tampa	36	7	30.14	30.18	+ .13	71.2	+ 0.1	88	24	82	47	3	61	27	60	73	0.86	— 1.0	2	4,441	e.	27	e.	15	13	2	3.9	90	1893	38	1891
East Gulf States.						68.8	+ 2.1										2.71	— 1.7												
Atlanta	1,131	18	29.00	30.18	+ .14	65.7	+ 4.1	89	17	76	38	3	56	34	50	62	0.58	— 3.1	6	7,006	nw.	38	nw.	2	15	7	8	4.1	89	1896	25	1881
Pensacola	56	17	30.11	30.17	+ .13	68.6	+ 0.8	83	22	75	43	3	62	26	60	78	1.14	— 2.3	4	7,050	sw.	41	sw.	29	14	11	5	4.5	92	1887	34	1881
Mobile	57	26	30.13	30.19	+ .16	68.8	+ 1.2	83	22	76	41	3	62	25	60	80	2.30	— 2.5	4	6,288	s.	34	nw.	1	7	12	11	5.8	90	1883	32	1881
Montgomery	221	24	29.92	30.15	+ .11	70.2	+ 4.3	90	18	81	40	3	59	27	57	69	4.17	— 0.6	6	4,703	sw.	32	nw.	26	15	11	4	3.9	90	*	30	1881
Meridian	358	7	29.76	30.14	+ .12	69.0	+ 3.4	88	22	80	34	3	58	33	57	73	5.23	+ 0.4	6	4,233	s.	24	se.	13	3	23	4	5.9	89	1894	28	1891
Vicksburg	254	25	29.83	30.09	— .08	70.4	+ 3.8	86	28	79	44	2	61	23	56	67	2.27	— 3.6	4	5,657	se.	28	se.	12	16	11	3	3.3	92	1887	31	1881
New Orleans	54	26	30.09	30.15	+ .14	70.6	+ 1.1	84	29	78	49	3	63	30	61	79	4.84	— 0.3	5	6,323	se.	36	se.	13	10	13	7	5.2	88	1889	38	1881
Port Eads	.....	10	.....	.....	.....	67.4	— 2.0	77	30	72	53	*	63	19	.....	.....	1.22	— 1.9	3	.....	e.	.....	.....	...	9	8	13	....	.....	.....	.....	.....
West Gulf States.						69.2	+ 2.2										2.15	— 1.7												
Shreveport	249	25	29.80	30.06	+ .08	69.3	+ 1.7	87	26	79	40	2	59	29	57	71	4.90	— 0.3	5	6,102	s.	34	s.	9	5	16	9	6.0	96	1887	32	1881
Fort Smith	481	14	29.48	29.99	+ .04	68.0	+ 5.7	90	26	79	32	3	57	35	54	64	0.46	— 4.6	5	6,133	e.	36	se.	8	11	9	10	5.3	94	1893	28	1891
Little Rock	302	17	29.75	30.07	+ .08	68.4	+ 5.6	87	27	78	34	3	59	28	56	70	2.67	— 2.1	5	5,938	s.	38	n.	26	4	17	9	6.3	94	1880	28	1886
Corpus Christi	20	10	30.01	30.08	+ .05	70.8	+ 0.7	82	*	74	53	2	67	17	67	89	1.60	0.0	12	11,624	se.	36	se.	28	1	9	20	7.7	92	1893	46	1891
Galveston	42	25	30.06	30.10	+ .11	69.0	+ 0.8	79	29	72	48	2	66	16	64	86	1.49	— 1.4	8	9,046	se.	38	n.	1	2	15	13	6.5	85	1878	43	1886
Palestine	510	15	29.52	30.06	+ .07	68.3	+ 1.8	85	14	78	38	3	59	33	57	72	1.32	— 3.4	7	6,422	s.	34	se.	11	1	14	15	7.2	92	1893	36	1896
San Antonio	704	19	29.29	30.03	+ .06	70.3	+ 0.8	91	26	79	44	2	62	31	59	75	2.73	— 0.2	9	7,537	se.	46	n.	1	3	8	19	7.2	99	1894	35	1896
Ohio Val. & Tenn.						62.4	+ 6.9										2.29	— 1.7												
Chattanooga	702	18	29.37	30.17	+ .15	65.0	+ 4.2	90	17	75	38	2	55	37	49	62	3.31	— 1.3	11	5,477	w.	37	nw.	21	10	12	8	5.1	90	1896	25	1881
Knoxville	980	26	29.12	30.16	+ .14	65.8	+ 5.2	90	18	75	35	4	53	35	49	64	4.34	— 0.7	9	3,889	w.	35	s.	14	14	8	8	4.5	90	1896	24	1881
Memphis	399	26	29.66	30.09	+ .10	69.0	+ 6.7	87	26	77	39	2	60	23	60	78	3.78	— 1.7	5	7,556	se.	44	se.	12	6	19	5	5.2	90	1893	27	1881
Nashville	545	26	29.54	30.12	+ .14	65.1	+ 5.5	88	23	75	36	4	55	33	50	63	2.92	— 1.9	11	5,918	se.	36	se.	12	15	10	5	4.3	90	1894	26	*
Lexington	989	13	29.36	30.10	+ .07	61.8	+ 8.5	88	18	72	28	3	52	35	44	57	0.40	— 2.9	6	9,896	sw.	44	w.	2	2	13	15	7.2	88	1896	24	1889
Louisville	525	25	29.54	30.11	+ .11	64.6	+ 7.7	90	17	76	30	3	54	36	45	55	0.25	— 4.2	6	7,149	s.	39	w.	2	11	15	4	4.5	91	1894	21	1875
Indianapolis	766	26	29.27	30.09	+ .10	60.0	+ 7.9	87	16	70	26	3	50	31	45	60	1.27	— 2.5	10	5,318	se.	27	sw.	2	9	12	9	5.5	87	1896	19	1875
Cincinnati	628	26	29.44	30.12	+ .12	61.6	+ 7.9	87	18	72	28	3	52	33	43	54	0.59	— 2.6	7	6,508	se.	37	w.	2	13	14	3	4.4	87	1896	18	1875
Columbus	824	18	29.23	30.11	+ .12	58.6	+ 7.9	89	18	69	23	3	48	34	46	70	2.70	— 0.5	12	5,676	sw.	36	e.	9	10	14	6	5.5	89	1896	15	1881
Pittsburg	842	26	29.22	30.13	+ .13	57.2	+ 6.3	90	18	67	22	3	48	33	48	75	3.39	+ 0.6	11	4,784	w.	21	w.	3	9	8	13	5.9	90	1896	14	1875
Parkersburg	638	8	29.45	30.13	+ .13	59.7	+ 7.7	93	18	71	26	3	48	37	45	62	2.37	— 1.0	12	4,412	se.	35	w.	3	3	14	13	6.6	93	1896	22	1892
Lower Lake Region.						50.9	+ 6.7										2.54	+ 0.2												
Buffalo	768	26	29.26	30.10	+ .12	46.5	+ 5.2	78	30	55	18	4	38	32	40	76	0.93	— 1.6	10	10,145	sw.	54	w.	2	5	11	14	6.6	83	1883	11	1881
Oswego	335	26	29.72	30.09	+ .10	47.4	+ 5.4	80	19	55	18	4	39	32	39	75	1.06	— 1.0	7	7,612	se.	36	w.	3	10	7	13	5.6	85	1885	13	1874
Rochester	523	26	29.53	30.10	+ .11	50.4	+ 7.2	82	17	59	19	4	42	29	40	72	1.09	— 1.4	12	5,910	sw.	36	sw.	2	13	12	5	4.5	90	1885	11	1879
Erie	714	23	29.32	30.10	+ .12	50.6	+ 6.7	81	18	60	20	3	42	40	44	81	1.46	— 1.0	13	7,698	w.	37	w.	2	5	14	11	6.1	89	1883	11	1881
Cleveland	740	26	29.29	30.09	+ .09	53.4	+ 8.5	85	18	62	22	*	45	26	44	75	4.72	+ 2.5	11	10,163	se.	56	w.	2	11	7	12	5.7	85	*	15	1875
Sandusky	629	18	29.40	30.09	+ .09	53.8	+ 7.9	88	17	62	21	2	46	44	43	74	4.12	+ 1.6	11	7,376	sw.	40	nw.	21	7	9	14	6.4	88	1896	14	1881
Toledo	674	26	29.36	30.08	+ .10	54.0	+ 7.3	86	16	64	21	3	45	43	43	72	3.30	+ 1.1	11	8,183	sw.	38	w.	2	9	10	11	5.4	86	1896	12	1875
Detroit	724	26	29.29	30.07	+ .08	51.2	+ 5.2	85	16	60	18	3	42	36	43	75	3.61	+ 1.4	12	8,101	sw.	43	w.	2	12	10	8	4.8	85	1896	8	1875
Upper Lake Region.						45.7	+ 5.3										3.43	— 1.1												
Alpena	609	24	29.37	30.05	+ .05	43.2	+ 6.2	78	15	51	13	3	35	37	37	81	2.46	+ 0.3	17	7,560	se.	35	se.	1	6	11	13	6.3	79	1886	— 2	1881
Grand Haven	628	25	29.34	30.03	+ .05	49.3	+ 5.6	78	29	59	14	2	40	33	41	78	3.47	+ 0.9	14	9,345	sw.	36	nw.	2	8	11	11	5.9	83	1894	9	1874
Marquette	734	25	29.19	30.00	.00	42.6	+ 6.2	70	*	51	10	2	34	35	35	79	3.12	+ 1.1	19	7,671	nw.	36	w.	1	3	10	17	7.1	87	1891	3	1875
Port Huron	639	22	29.39	30.09	+ .10	49.0	+ 8.0	84	16	58	19	3	40	38	41	77	2.52	+ 0.4	14	8,637	se.	39	nw.	3	9	10	11	5.5	84	1896	7	1875
Sault Ste. Marie	642	8	29.33	30.04	+ .01	40.0	+ 3.5	68	28	48	0	3	32	31	32	79	3.13	+ 1.5	16	6,753	se.	34	se.	9	6	8	16	7.0	75	1891	3	1890
Chicago	894	26	29.14	30.03	+ .05	53.4	+ 7.6	84	16	62	18	2	45	36	41	67	2.79	— 0.3	11	14,365	s.	60	s.	18	12	11	7	4.6	84	*	17	*
Milwaukee	673	26	29.30	30.05	+ .06	48.0	+ 4.8	85	16	57	14	2	39	39	41	81	3.85	+ 1.0	15	7,865	sw.	37	sw.	1	11	6	13	5.6	85	1896	12	*
Greenbay	617	10	29.35	30.03	+ .04	47.7	+ 5.8	84	15	57	11	2	38	42	38	74	5.48	+ 3.3	14	7,044	e.	36	sw.	1	4	10	16	7.2	84	1896	11	1896
Duluth	702	26	29.20	29.96	— .02	38.1	+ 0.4	60	19	45	11	2	32	29	32	81	4.06	+ 1.6	15	8,103	ne.	52	nw.	1	8	8	14	6.6	81	1891	3	1881
North Dakota.						41.6	0.0										3.19	— 1.2												
Moorhead	905	16	28.91	29.95	— .03	42.0	+ 2.1	76	27	50	14	2	34	34	33	75	4.48	+ 2.2	15	9,302	n.	51	se.	28	6	9	15	6.9	91	1891	—13	1881
Bismarck	1,681	22	28.13	29.95	— .02	42.2	0.0	79	27	52	18	1	32	35	29	64	2.23	— 0.1	8	9,483	n.	43	nw.	23	8	9	13	6.2	90	1891	1	1881
Williston	1,875	18	27.90	29.93	— .04	40.8	— 2.1	76	27	52	10	16	30	39	30	72	2.86	+ 1.5	6	8,272	nw.	52	w.	19	8	12	10	5.5	92	1881	4	1888
Upper Miss. Valley.						56.5	+ 5.8										3.94	0.9												
Minneapolis	.....	7	.....	.....	.....	48.2	+ 2.5	81	15	57	15	3	39	33	.....	.....	5.12	+ 2.1	17	.....	e.	.....	.....	...	8	8	14	....	84	1891	15	1896
St. Paul	850	26	29.08	29.96	— .01	47.4	+ 1.5	80	15	56	15	3	39	32	38	72	5.63	+ 3.2	18	6,477	se.	37	se.	25	6	13	11	6.3	84	1887	7	1874
La Crosse	.....	24	.....	.....	.....	50.8	+ 3.7	84	15	62	15	2	40	40	.....	.....	5.84	+ 3.6	15	6,279	s.	34	w.	2	8	15	7	5.5	86	1895	10	1881
Davenport	613	25	29.32	29.97	— .01	57.1	+ 7.7	83	15	66	22	2	48	33	43	63	3.41	+ 0.6	11	9,421	sw.	44	sw.	2	8	14	8	5.5	87	*	14	1896
Des Moines	869	18	29.03	29.90	.00	56.0	+ 5.6	86	15	67	30	3	45	34	42	63	3.47	+ 0.7	12	8,214	se.	38	sw.	15	9	7	14	6.1	89	1883	11	1881
Dubuque	651	23	29.26	29.99	+ .02	55.0	+ 6.6	86	15	65	30	2	45	32	42	68	7.80	+ 5.0	15	3,021	s.	24	s.	13	7	17	6	5.8	88	1895	14	*
Keokuk	613	25	29.33	29.98	— .02	60.0	+ 7.9	87	15	70	33	3	50	40	45	62	2.35	— 0.9	11	7,987	sw.	42	sw.	13	10	13	7	4.6	88	1895	20	*
Cairo	359	25	29.08	30.05	— .09	65.8	+ 7.2	85	23	74	36	3	58	27	53	67	2.57	— 1.3	11	7,423	s.	36	se.	12	4	20	6	5.4	89	1872	24	1875
Springfield, Ill	644	17	29.34	30.03	+ .04	60.0	+ 6.9	84	27	70	36	3	50	40	46	65	1.91	— 1.8	7	9,586	s.	44	s.	13	8	14	8	5.3	88	1895	19	1881

TABLE I.—*Climatological data for Weather Bureau Stations, April*, 1896—Continued.

Stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.								Humidity and precipitation.					Wind.				Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Monthly temperature data since opening station.			
			Mean pressure, 8 a. m. and 8 p. m. + 2.	Mean reduced.	Departure from normal.	Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.				Absolute maximum.	Year	Absolute minimum.	Year
Up. Miss. Val.—Con																													
Hannibal	534	....	29.41	29.98	.....	61.6	.....	87	15	72	26	3	52	38	45	60	2.83	+ 0.1	12	8,618	s.	49	sw.	13	15	7	8	4.1	....	....	....	....
St. Louis	571	26	29.44	30.05	+ .08	64.8	+ 8.1	*88	16	75	30	3	55	35	49	62	2.43	— 1.4	8	10,138	s.	39	nw.	1	13	12	5	4.7	89	*	22	1875
Missouri Valley.						56.8	+ 4.6										4.32	+ 1.2													
Columbia	.....	7	.....	.....	.....	63.6	— 7.6	90	*	75	21	3	52	39	.....	.....	3.08	— 1.4	13	8,654	sw.	39	sw.	13	8	6	16	6.4	90	*	21	1893
Kansas City	963	8	28.94	29.96	.00	61.4	— 6.7	87	30	71	25	1	51	34	49	68	3.21	+ 0.3	11	8,336	se.	36	sw.	30	7	12	11	5.5	90	1893	24	1891
Springfield, Mo	1,324	11	28.60	29.99	+ .02	62.8	+ 5.7	85	15	72	28	2	53	32	50	70	3.95	0.0	11	10,178	se.	48	se.	12	6	21	3	5.1	88	*	26	1891
Topeka	.....	9	.....	.....	.....	62.8	+ 7.5	90	15	74	25	1	51	38	.....	.....	4.00	+ 1.6	11	.....	se.	....	.....	..	9	7	14	....	97	1893	23	1891
Omaha	1,123	25	28.72	29.92	— .06	56.8	+ 5.4	89	10	67	30	1	46	34	42	64	4.28	+ 1.2	15	7,583	se.	40	ne.	26	10	4	16	6.0	90	1891	6	1881
Sioux City	1,165	7	.....	.....	.....	51.8	+ 2.3	85	27	64	17	2	40	41	.....	.....	6.16	+ 3.1	14	9,943	se.	50	nw.	26	11	9	10	5.2	93	1891	13	1890
Pierre	1,470	20	28.31	29.89	— .10	48.0	+ 0.4	89	26	58	23	2	38	36	36	70	3.70	+ 1.8	9	8,989	n.	44	ne.	10	8	10	12	6.0	93	1891	11	1875
Huron	1,310	15	28.49	29.91	— .07	47.3	+ 1.5	86	26	58	18	1	36	37	36	71	6.17	+ 3.2	12	11,176	se.	51	se.	7	8	10	12	6.2	94	1887	9	1886
Northern Slope.						42.9	— 2.2										1.71	+ 0.1													
Havre	2,477	16	29.25	29.91	— .06	39.4	— 5.0	74	25	51	6	17	28	41	27	68	1.09	+ 0.1	7	6,754	sw.	33	w.	7	10	14	6	5.0	84	1891	6	1896
Miles City	2,372	19	27.36	29.89	— .09	43.6	— 3.0	79	25	56	19	18	31	41	30	62	1.26	+ 0.2	8	6,414	nw.	38	nw.	30	10	11	9	5.4	90	1881	14	1880
Helena	4,108	17	25.72	29.99	— .01	39.4	— 5.5	64	25	50	6	16	29	31	23	56	1.23	+ 0.1	5	5,360	sw.	36	sw.	6	11	10	9	4.8	82	1891	6	*
Rapid City	3,260	11	26.49	29.89	— .12	45.8	+ 0.4	83	26	58	14	2	34	40	27	55	1.67	— 0.6	13	7,745	n.	58	n.	28	8	8	14	6.4	87	1891	2	1883
Cheyenne	6,105	26	23.87	29.94	— .07	41.6	— 1.5	71	25	54	8	1	29	38	24	55	2.08	+ 0.7	6	8,570	nw.	44	nw.	28	6	17	7	5.4	80	1874	2	1875
Lander	5,377	14	24.52	29.97	— .08	39.4	— 2.5	69	26	52	5	1	27	38	20	55	1.20	— 1.1	10	3,935	sw.	36	sw.	22	7	15	8	5.8	76	1888	2	1895
North Platte	2,826	22	26.95	29.90	— .07	51.1	+ 1.7	84	27	64	18	2	38	42	38	67	3.44	+ 1.3	6	9,561	se.	49	nw.	29	10	15	5	5.0	93	1887	12	1875
Middle Slope.						59.0	— 5.2										2.31	+ 0.2													
Denver	5,290	25	24.59	29.91	— .07	49.6	+ 1.5	80	26	64	9	2	35	42	24	47	0.93	— 1.1	6	6,910	s.	55	nw.	30	13	12	5	4.4	83	1874	4	1876
Pueblo	4,734	8	25.10	29.85	— .11	53.4	+ 2.6	81	26	70	15	2	37	47	12	29	0.57	— 0.9	4	8,056	se.	54	n.	12	13	14	3	3.7	84	1891	15	*
Concordia	1,410	11	28.38	29.86	— .17	61.0	— 7.9	92	10	74	32	2	48	43	45	64	2.60	+ 0.5	12	8,590	s.	44	s.	8	11	12	7	4.9	97	1893	18	1886
Dodge City	2,504	22	27.24	29.83	— .09	59.9	+ 5.8	92	26	74	16	2	46	46	42	61	5.50	+ 3.9	9	12,241	s.	59	s.	28	15	12	3	4.0	93	1893	13	1881
Wichita	1,351	8	28.46	29.88	— .07	63.7	+ 7.9	89	27	75	24	2	52	42	48	65	3.26	+ 1.0	5	10,017	s.	44	s.	28	9	14	7	4.8	98	1893	22	1891
Oklahoma	1,239	....	28.65	29.95	.00	66.1	+ 5.7	92	26	78	38	2	55	37	52	69	1.02	— 1.9	6	10,247	s.	40	n.	1	18	8	4	3.8	95	1893	22	1891
Southern Slope.						.....	.....										.....	.....													
Abilene	1,749	11	28.16	29.97	+ .01	68.5	+ 4.4	96	26	80	28	2	58	33	49	59	1.11	— 1.6	2	10,651	se.	60	sw.	12	7	16	7	5.6	99	1887	25	1886
Amarillo	3,691	....	26.15	29.88	.....	59.8	.....	86	25	74	24	1	45	40	29	42	1.95	....	8	14,925	s.	66	w.	28	12	9	9	4.7	90	1893	24	*
Southern Plateau.						60.3	— 2.2										0.29	0.0													
Elpaso	3,767	18	26.13	29.91	— .02	64.0	— 0.3	90	22	80	35	19	48	45	11	17	T.	— 0.2	0	10,782	nw.	64	sw.	12	14	13	3	3.4	98	1879	29	1882
Santa Fe	6,998	24	23.19	29.92	— .03	47.8	— 0.3	70	22	60	13	1	35	30	— 2	19	1.11	+ 0.4	2	6,792	sw.	50	sw.	10	19	8	3	3.2	84	1879	11	1875
Phœnix	1,106	....	28.76	29.92	.....	63.7	— 3.5	89	9	79	38	*	49	41	29	33	0.05	— 0.2	1	4,285	w.	34	w.	27	24	3	3	2.0	....	....	....	....
Yuma	141	21	29.76	29.90	— .01	65.8	— 4.7	91	29	81	41	18	50	42	33	36	T.	— 0.1	0	6,657	w.	37	w.	10	35	5	0	1.5	105	1876	40	1878
Middle Plateau.						43.2	— 6.0										1.94	+ 0.6													
Carson City	4,730	9	25.30	30.01	.....	42.6	— 6.3	65	12	53	21	20	33	35	22	45	1.35	+ 0.5	14	.....	sw.	....	.....	....	10	11	9	5.7	82	1888	16	1895
Winnemucca	4,340	18	25.55	29.99	+ .01	40.6	— 7.2	64	5	51	19	1	30	35	19	47	1.95	+ 1.0	19	8,310	sw.	48	sw.	13	3	14	13	6.5	83	1888	17	1883
Salt Lake City	4,344	23	25.52	29.96	— .04	46.4	— 4.4	74	6	56	18	1	36	32	26	52	2.53	+ 0.3	11	5,710	se.	37	w.	30	3	12	15	7.2	84	1889	18	1896
Northern Plateau.						44.0	— 3.6*										1.81	+ 0.3													
Baker City	3,430	7	26.32	29.90	— .08	40.9	— 3.1	59	4	50	24	19	32	32	27	63	1.07	— 0.1	17	4,415	se.	32	se.	9	1	13	16	7.6	81	1895	18	1890
Idaho Falls	4,742	7	25.11	29.97	— .03	40.9	— 1.1	66	6	52	13	1	30	37	28	67	1.13	— 0.7	10	7,177	s.	36	s.	24	5	8	17	7.0	76	1895	13	1896
Spokane	1,930	16	27.87	29.94	— .05	45.2	— 3.9	66	24	54	25	1	37	36	29	59	1.30	— 0.2	12	5,362	sw.	28	sw.	13	2	7	21	7.8	86	1890	22	1890
Walla Walla	1,018	11	28.84	29.94	— .06	48.9	— 6.3	72	24	58	30	3	40	33	41	76	3.85	+ 2.3	19	5,068	s.	33	w.	24	6	21	3	5.5	89	1890	29	*
N. Pac. Coast Reg.						45.5	— 3.8										5.72	+ 1.2													
East Clallam	.....	....	.....	.....	.....	43.4	.....	69	24	52	28	*	35	29	.....	.....	4.54	.....	17	.....	sw.	....	.....	..	8	1	21	....	....	....	....	....
Fort Canby	179	13	29.74	29.94	— .10	45.6	— 3.0	61	4	51	34	3	40	24	41	88	6.99	+ 1.5	24	10,058	w.	60	s.	30	5	3	22	7.4	78	1884	34	1896
Neah Bay	.....	12	.....	.....	.....	44.8	— 4.0	62	24	53	27	3	37	36	.....	.....	7.87	+ 2.8	17	.....	sw.	....	.....	..	3	10	17	....	69	1885	37	1896
Port Angeles	20	12	29.88	29.90	— .12	43.8	— 1.8	59	30	51	28	3	37	33	35	75	1.01	— 1.0	17	4,398	s.	34	w.	13	8	14	8	5.8	67	1891	27	1891
Port Crescent	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	24	3	....	....	.....	.....	1.73	.....	11	.....	w.	....	.....	..	8	10	12	....	....	....	....	....
Pysht	.....	....	.....	.....	.....	44.6	.....	63	30	55	21	3	34	32	.....	.....	3.43	.....	19	.....	e.	....	.....	..	9	2	19	....	....	....	....	....
Seattle	119	....	29.80	29.92	.....	47.0	.....	66	30	54	33	16	40	29	37	74	3.27	.....	21	5,020	s.	30	sw.	7	4	7	19	7.2	....	....	....	....
Tatoosh Island	86	13	29.81	29.91	— .09	44.6	— 2.4	60	24	49	33	22	40	17	39	81	6.73	— 0.6	20	9,189	e.	48	sw.	7	5	9	16	7.1	64	1890	29	1890
Astoria	.....	12	.....	.....	.....	46.6	— 3.1	64	4	53	32	3	40	26	.....	.....	9.19	+ 3.3	24	.....	w.	....	.....	..	6	3	21	....	71	1885	32	*
Portland, Oreg	157	25	29.78	29.96	— .09	47.0	— 6.2	67	30	54	34	3	40	28	37	73	4.09	+ 0.8	21	7,000	s.	36	s.	7	5	16	9	6.3	85	1880	28	1875
Roseburg	523	19	29.40	29.97	— .10	46.3	— 6.2	65	21	54	32	1	38	29	37	75	4.18	+ 1.6	19	3,335	sw.	38	sw.	7	2	5	23	8.4	86	1890	26	1890
Mid. Pac. C'st Reg.						50.9	— 4.5										5.90	+ 3.4													
Eureka	64	10	29.99	30.05	— .05	48.3	— 1.7	62	4	55	35	*	41	21	42	82	11.13	+ 7.0	23	5,994	se.	38	nw.	18	1	18	11	6.6	73	1891	31	1895
Redbluff	334	19	29.64	30.00	.00	52.2	— 8.3	74	2	61	34	15	43	32	38	65	3.67	— 1.5	11	5,832	se.	30	sw.	29	9	8	13	5.9	93	*	34	*
Sacramento	71	19	29.96	30.04	+ .02	53.3	— 6.2	72	*	62	36	15	45	25	43	73	5.34	+ 3.1	10	6,865	sw.	39	s.	24	12	7	11	5.3	89	1888	36	*
San Francisco	153	26	29.90	30.06	+ .02	51.6	— 4.4	66	1	56	41	10	47	18	43	76	5.16	+ 3.2	15	8,354	w.	36	w.	12	12	3	15	5.6	88	1888	40	*
Point Reyes Light	.....	8	.....	.....	.....	49.3	— 1.9	63	26	54	37	15	44	22	.....	.....	4.20	+ 2.4	14	.....	nw.	....	.....	..	16	2	12	....	72	1894	30	1895
S. Pac. Coast Reg.						55.8	— 4.5										1.09	— 0.1													
Fresno	332	9	29.66	30.02	.00	54.7	— 7.3	76	5	66	34	17	43	34	38	61	2.82	+ 1.5	7	5,036	nw.	24	nw.	25	15	8	7	4.1	98	1888	34	*
Los Angeles	330	19	29.67	30.03	+ .02	56.2	— 3.8	81	2	67	38	21	46	33	43	67	0.19	— 1.2	4	3,339	w.	24	w.	16	11	16	3	3.5	99	1888	38	1896
San Diego	69	25	29.97	30.05	+ .02	56.5	— 2.5	74	1	64	42	20	49	24	45	67	0.25	— 0.5	4	4,679	nw.	26	nw.	2	26	2	2	2.2	93	1888	39	1875
San Luis Obispo	201	....	29.86	30.08	.....	51.4	.....	78	1	60	32	20	42	43	42	71	2.22	.....	10	4,781	w.	30	s.	24	16	9	5	3.7	....	....	....	....

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record.

* Two or more directions, dates, or years.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, April, 1896.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alco†	90	36	69.2	3.09	
Ashville*†	92	38	68.0	4.21	
Bermuda†	91	33	69.8	2.46	
Birmingham†	90	40	70.0	4.87	
Carrollton*†	84	38	69.0	6.78	
Citronelle†	85	45	70.4	2.63	
Claiborne†				2.40	
Clanton†	86	38	68.0	4.92	
Cordova†				4.53	
Daphne†	87	42	71.2	1.80	
Decatur†	91	31	66.0	4.20	
Demopolis†				7.10	
Elba†		34			
Eufaula *a*†	92	45	72.7	2.32	
Eufaula *c*†				2.42	
Evergreen†	92	35	68.8	3.21	
Florence *a*†				3.80	
Florence *b*†	88	34	66.8	4.16	
Fort Deposit †	91	39	71.0	2.49	
Gadsden†	91	34	64.4	2.68	
Goodwater†	92	40	68.4	2.83	
Greensboro†	89	36	68.6	5.64	
Hamilton†				3.05	
Healing Springs†	90	30	66.9	2.65	
Highland Home†	91	40	69.2	3.93	
Jasper†	92	32	67.5		
Livingston†	89	35	69.0	5.88	
Lock No. 4				2.44	
Madison Station†	89	32	66.6	4.51	
Maple Grove†				3.07	
Marion†	89	37	69.4	4.20	
Mount Willing†	92	37	71.2	3.57	
Newbern†	90	36	69.4	6.80	
Newton†	90	38	69.0	2.00	
Oneonta†	92	35	66.6	3.13	
Opelika†	92	34	69.6	1.29	
Oxanna†	88	40	66.8	2.64	
Pineapple†	94	30	70.1	3.16	
Pushmataha†	88	36	69.3	11.30	
Rock Mills†	88	37	66.9		
Scottsboro†	90	34	65.4	5.72	
Selma†				3.63	
Sturdevant†				1.34	
Talladega*†	90	38	68.0		
Tallassee Falls†				2.72	
Tuscaloosa†	94	33	69.8	4.74	
Tuscumbia†	88	35	64.3	3.78	
Union†	91	31	68.2	5.19	
Union Springs†	92	38	70.2	2.41	
Uniontown†	90	40	70.2	5.62	
Valleyhead†	88	30	64.2	2.91	
Warrior†				2.44	
Wetumpka				3.35	
Wilsonville†				2.85	
Alaska.					
Killisnoo†	48	21	31.6	0.65	T.
Kodiak*‖	56	20	31.5		
Arizona.				0.00	
Antelope Valley†				0.00	
Arizona Canal Co. Dam	91	36	64.8	0.00	
Benson*§	95	44	63.6	0.00	
Bisbee†	89	30	59.1	0.23	T.
Buckeye†	92	35	63.7	0.00	
Calabasas†	83	32	58.4	0.00	
Casa Grande*§	93	30	66.4	0.00	
Dragoon†				0.10	
Dragoon Summit*§	84	33	65.6	0.09	
Dudleyville†	90	27	61.7	0.04	
Eagle Pass*§		32	53.2	0.24	T.
Farleys Camp†	91	36	64.2	0.00	
Flagstaff†	74	8	41.9	2.00	20.0
Fort Apache	78	13	48.8	0.34	T.
Fort Huachuca†	82	30	57.4	0.04	0.4
Fort Mohave†	96	42	67.4	0.00	
Gilabend *a**§	92	45	69.4	T.	
Gilabend *b*†	95	28	66.4	0.05	
Gisela*†	83	30	56.0	0.17	
Glendale	86	23	61.1	0.00	
Holbrook†	80	14	50.7	0.17	T.
Ingleside	92	35	63.4	0.06	
Maricopa*§	97	45	68.8	0.00	
Mesa†	96	40	65.0	0.03	
Mount Huachuca†	83	28	53.7	0.05	0.5
Natural Bridge†				0.42	3.0
Oracle†	80	31	58.8	0.37	T.
Oro				0.00	
Oro Blanco	82	36	63.2	0.05	
Pantano*§	89	38	66.7	3.00	
Parker†	94	32	68.6	0.00	
Payson				0.40	2.0
Peoria†	87	36	64.1	0.08	
Phœnix	87	36	62.6	0.00	
Pinal Ranch				0.50	0.8
Reymert†	88	37	63.0	0.00	
San Carlos†	90	25	60.6	T.	
San Simon*§	85	29	62.1	0.00	
Arizona—Cont'd.					
Showlow				0.42	4.2
Signal†	87	34	62.2	0.00	
Sulphur Spring Valley†				T.	
Texas Hill*§	92	39	67.8	0.00	
Tucson *c*†	93	31	63.8	0.12	T.
Walnut Ranch*‖	78	31	55.4	0.31	
Wells	92	34	64.4	T.	
Whipple Barracks†	72	14	47.2	0.35	1.5
Wilgus†				0.42	T.
Willcox*§	80	28	62.4	0.00	
Arkansas.					
Arkansas City†				3.10	
Beebranch†	92§	28§	66.2§	5.50	
Blanchard Springs†	90	31	68.7	6.45	
Brinkley†	88	34	69.8	5.03	
Camden *a*†				3.54	
Camden *b*†	90	30	68.6	4.86	
Conway*§	84	38	67.7	2.57	
Corning†	91	31	66.8	4.27	
Dallas†,	86	28	66.2	1.13	
Dardanelle†				1.03	
Elon†	89	31	69.0	3.25	
Fayetteville†	87	28	65.6	4.29	
Forrest†	87	32	69.2	9.36	
Fulton†				1.40	
Gaines Landing†				2.10	
Helena *a*†				5.52	
Helena *b*†	90	35	67.4	4.86	
Hot Springs *a*	89	33	68.6	1.73	
Hot Springs *b*				3.62	
Hot Springs (near)				3.13	
Jonesboro†	84	30	63.4	2.69	
Keesees Ferry†	93	34	66.4	3.52	
Kirby†	86	34	69.2	1.90	
Lacrosse†	89	39	65.2	2.06	
Latour				5.21	
Lonoke*‖	91	36	70.6	6.00	
Luna Landing*§	86	39	69.8	2.41	
Madding§			69.4	6.00	
Malvern†	91	30	69.0	5.32	
Marvell				4.99	
Mossville	82	33	64.0	3.56	
Mount Nebo†	86	38	68.8	1.68	
New Gascony				5.66	
Newport *a*†				4.89	
Newport *b*†	87	34	67.0	4.61	
Newport *c*†	89	35	67.6	4.09	
Osceola†	87	35	67.9	4.91	
Ozark†	89	31	69.6	0.87	
Pinebluff†	92	50	72.4	5.39	
Pocahontas†	85	30	65.4	6.79	
Rison†	88	29	67.4	4.75	
Russellville†	90	31	68.3	2.17	
Silver Springs†	90	25	65.2	2.77	
Stuttgart†	89	36	69.3	4.78	
Texarkana†	88	36	68.8		
Warren†	94	32	69.8	4.78	
Washington*†	88	32	69.2	1.98	
Winslow†	83	30	63.4	1.75	
Witts Springs†	87°	28°	65.0°	2.72	
California.					
Adin	61	14	38.9	3.96	26.5
Agnew	72	30	50.7	3.34	
Arlington Heights	81	35	55.4	0.74	
Athlone*§	73	38	55.8	1.33	
Azusa				0.70	
Ballast Point L. H.				0.15	
Barstow†	82	27	54.2	0.00	
Bear Valley†				18.32	127.5
Berkeley	66	36	51.6	6.72	
Bishop†	73	20	43.8	0.17	
Bishop Creek*§	73	28	49.8	0.05	T.
Boca*§	59	14	36.6	6.65	62.0
Bodie†	51	0	27.3	2.64	13.0
Bowmans Dam†				18.45	116.7
Caliente*§	76	40	56.0	1.58	
Calloway Canal†				0.30	
Cape Mendocino L. H.				11.25	
Cedarville†	60	16	38.4	1.69	18.0
Centerville*‖	74	45	55.6	4.47	
Chico*§	78	36	53.4	5.88	
Chino*†§	78	40	55.7	T.	
Cisco*§	44	12	29.2		153.0
Claremont†	76	31	53.0	0.40	
Cloverdale*‖	70	34	54.4	6.88	
Corning*§	73	35	52.4	3.95	
Coronado	80	48	61.8	0.25	
Craftonville	80	32	54.6	0.40	
Crescent City†	58	31	46.8	12.50	
Crescent City L. H.				15.67	
Davisville*b*	85	39	59.4	6.45	
Delano*§	77	41	58.0	0.28	
Delta*§	74	34	49.4	16.72	
Descanso*§	76	30	52.8	1.14	T.
Drytown	72	31	49.7	6.50	
Dunnigan*§	76	40	60.6	5.45	
California—Cont'd.					
Durham*‖	65	33	48.5	5.70	
East Brother L. H.				1.85	
Edgwood*§	65	30	44.4	4.66	
Edmanton*‖	60	16	35.0	16.25	70.0
Escondido	97	26	57.6		
Evergreen				3.50	
Fallbrook*‖	84	37	53.6	0.26	
Folsom City *b*‖	74	43	55.3	6.44	
Fordyce Dam				15.67	180.0
Fort Ross				6.58	
Fort Tejon				3.33	
Georgetown†	64	27	44.5	16.51	4.0
Glendora				0.26	
Goshen*§	80	30	53.6	0.87	
Grass Valley				12.47	
Greenville†	68	18	40.4	11.05	40.0
Guinda				4.72	
Healdsburg*‖	70	32	50.5	7.10	
Hollister	72	26	51.2	2.49	
Hueneme				0.55	
Humboldt L. H.				10.96	
Hydesville†	65	30	48.1	11.26	
Indio*§	83	43	66.9	0.00	
Iowa Hill*‖	65	34	45.1	14.01	
Isabella	89	32	52.6	0.89	1.0
Jackson	65	27	44.1	10.89	
Jolon				3.62	
Julian†	74	28	46.4	1.40	2.5
Keeler*§	76	40	59.1	T.	
Keene*§	72	30	49.6	2.82	
Kennedy Gold Mine	69	30	48.9	11.20	
Kernville				0.86	
King City*§	78	36	58.1	1.84	
Kingsburg*§	75	45	59.5	1.10	
Kono Tayee	68	35	49.4	4.62	
Lagrange*§	77	35	55.8	3.25	
Laporte*†‖	55	20	33.3	16.63	141.0
Lemoore *a**§	78	37	56.9	0.47	
Lick Observatory†	55	24	37.6	6.70	9.5
Lime Kiln	82	31	57.2		
Lime Point L. H.				4.14	
Lodi	73	34	53.6	2.90	
Los Alamos†				2.24	
Los Gatos *b*	69	36	50.6	7.25	
McMullin*‖	76	32	54.4		
Malakoff Mine*‖	67	29	42.7	17.78	28.0
Manzana	75	26	45.4	0.63	
Mare Island L. H.				5.45	
Merced*§	73	39	59.9	1.72	
Middletown*†‖	71	29	48.5	8.54	
Mills College				5.60	
Milton (near)*‖	75	40	55.6	6.24	
Modesto*§	78	43	54.8	2.22	
Mohave*§	78	35	52.3		
Mokelumne Hill*§		35	46.4	10.06	
Monterey*§	68	40	53.7	2.17	
Mountain Home				11.01	96.8
Mount Frazier†				2.22	17.0
Mount Glenwood*‖	72	43	53.9	7.01	
Mt. Lowe Observatory				0.60	T.
Mutah Flat†				3.50	
Napa *b*	76	32	52.8	6.28	
Nevada City†	63	25	43.2	13.63	
Newcastle *a*†	68	31	48.8	6.92	
Newhall*§	80	36	55.5	1.03	
Nordhoff†	82	29	53.0	1.72	
Oakland *a*	70	39	53.6	6.88	
Ogilby*§	98	41	72.5	0.00	
Oleta*‖	65	35	47.1	9.55	
Orangevale†	68	34	52.4	6.95	
Orland*§	78	41	53.8	3.03	
Oroville *b*	75	38	56.2	7.03	
Palermo†	74	32	53.8	3.78	
Paso Robles *b*	69	28	49.4	1.35	
Peachland*‖	70	34	51.1	6.03	
Picacho	90	48	68.4	0.00	
Piedras Blancas L. H.				2.86	
Pigeon Point L. H.				4.25	
Pilot Creek				16.67	47.5
Placerville *b*	64	27	44.6	12.00	T.
Point Ano Nuevo L. H.				1.88	
Point Arena L. H.				5.22	
Point Bonita L. H.				5.76	
Point Conception L. H.				1.22	
Point Fermin L. H.				0.20	
Point George L. H.				5.08	
Point Hueneme L. H.				0.64	
Point Lobos	61	42	50.5	3.99	
Point Loma L. H.				0.07	
Point Montara L. H.				6.71	
Point Pinos L. H.				3.63	
Point Reyes L. H.				4.20	
Point Sur L. H.				3.63	
Pomona (near)	83	31	56.3	0.15	
Portersville*§	79	43	57.9	1.13	
Poway*§	75	42	51.6	0.96	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Quincy†	66	22	41.2	11.03	29.0
Ravenna*§	78	37	57.0	.....	
Redding *b*†	71	32	51.0	4.05	
Reedley (near)*¹	77	44	57.3	0.85	
Represa	70	36	54.0	6.54	
Riovista	73	30	51.9	4.51	
Robertsons Mills	.....	.....	.....	1.50	
Roe Island L. H	.....	.....	.....	4.70	
Roseville (near)	74	30	50.4	6.30	
Rosewood	74	30	50.4	4.58	
Sacramento *a*	76	35	55.8	5.73	
Salton*§	100	45	74.0	0.00	
San Bernardino†	82	30	56.0	0.37	
San Jacinto †	78	30	53.8	0.71	
San Jose *b*	76	28	52.2	2.79	
San Leandro*¹	71	44	54.8	5.86	
San Luis L. H	.....	.....	.....	1.70	
San Mateo*§	68	47	57.1	5.00	
San Miguel*§	74	36	55.6	1.35	
San Miguel Island †	72	41	53.8	0.93	
San Rafael †	.....	.....	.....	10.00	
Santa Ana*§	78	52	67.1	.....	
Santa Barbara *a*	76	36	55.8	1.78	
Santa Barbara L. H	.....	.....	.....	1.62	
Santa Clara *a*†§	66	36	51.1	2.72	
Santa Cruz *b*	75	31	53.1	3.07	
Santa Cruz L. H	.....	.....	.....	2.87	
Santa Maria	74	32	54.4	1.77	
Santa Monica*§	81	45	66 3	0.23	
Santa Paula *b*†	81	35	55.1	1.00	
Santa Rosa*§	69	38	54.2	4.70	
Saticoy†	.....	.....	.....	0.68	
Shasta	.....	.....	.....	12.27	
Shasta Springs†	65	24	40.2	9.47	12.0
Sneddens Ranch†	.....	.....	.....	3.79	2.0
S. E. Farallone L. H	.....	.....	.....	3.69	
Stanford University	68	31	51.2	4.86	
Stockton *a*	70	36	53.4	2.65	
Summerdale†	57	18	35.9	9.21	32.0
Susanville†	66	23	41.8	5.10	28.5
Sutter Creek*§	68	26	44.2	7.04	
Tecarte Dam*†	77	28	44.8	1.04	
Tehama*§	79	41	54.5	3.90	
Tejon Ranch	.....	.....	.....	1.62	
Templeton*§	76	36	53.4	2.58	
Trinidad L. H	.....	.....	.....	11.52	
Truckee*§	54	12	34.2	9.36	90.0
Tulare *b*	.....	.....	.....	1.13	
Tulare *c*	90	30	58.1	1.03	
Turlock *b*†	79	28	54.0	2.40	
Ukiah†	68	30	48.4	5.97	
Upper Lake	70	30	47.1	6.01	
Upper Mattole*¹	72	35	48.8	17.02	
Vacaville *a*¹	78	40	53.6	7.03	
Ventura†	78	32	52.2	1.10	
Volcano Springs*§	100	43	73.8	0.00	
Walnutcreek	72	34	54.0	4.65	
Washington*¹	74	28	44.1	9.99	16.0
Westpoint†	.....	.....	.....	13.04	4.5
Wheatland†	71	34	52.6	6.21	
Williams*§	72	40	55.0	2.90	
Willows *b*§	74	38	56.1	3.22	
Wilmington*§	79	50	61.2	.....	
Wire Bridge*§	73	34	53.0	8.00	
Yerba Buena L. H	.....	.....	.....	4.21	
Yreka†	67	22	43.5	2.28	6.0
Yuba City*§	65	38	54.1	5.69	
Engineers Quarters‡	.....	.....	.....	1.72	5.0
Morses House‡	.....	.....	.....	2.63	7.0
Grass Valley‡	.....	.....	.....	2.07	6.0
Deep Creek‡	.....	.....	.....	1.75	.....
Holcomb Creek‡	.....	.....	.....	1.02	.....
Squirrel Inn‡	.....	.....	.....	0.98	4.0
Green Valley‡	.....	.....	.....	2.17	2.0
Tunnel No. 2‡	.....	.....	.....	0.69	1.5
Colorado.					
Alma†	56	—15	31.0	0.74	
Arkins	.....	.....	.....	1.22	
Boxelder	.....	.....	.....	1.10	
Breckenridge†	64	—16	34.0	0.60	5.5
Brush *d*	83	15	49.1	0.80	8.0
Byers*¹	80	19	43.2	.....	12.0
Canyon†	82	9	53.0	0.63	8.0
Castlerock†	74	7	44.0	2.30	13.0
Climax†	46	— 8	26.6	2.10	21.0
Collbran	.....	.....	.....	0.29	
Colorado Springs†	74	9	48.0	0.72	7.4
Cope†	84	12	50.1	4.00	5.0
Crook	86	15	50.0	2.44	
Delta†	88	10	53.1	0.00	
Denver	.....	.....	.....	.....	0.5
Downing†	81°	11°	50.9°	1.80	18.0
Dumont*†§	73	3	43.9	1.22	12.2
Durango†	68	12	45.6	0.55	4.5
First View*§	86	.....	55.5	2.80	
Fleming	.....	.....	.....	0.35	0.5
Fort Collins†	80	7	46.6	1.26	2.8
Fox	.....	.....	.....	3.07	
Garnett	.....	.....	.....	0.10	1.0
Gleneyrie†	74	7	47.4	1.16	
Goldhill	.....	.....	.....	1.80	14.0
Grand Junction†	78	17	52.8	0.18	
Greeley†	83	7	47.5	1.18	3.2
Gulch†	71	7	41.7	0.60	3.0
Gunnison†	68	— 3	39.8	0.00	
Holly	.....	.....	.....	0.90	
Holyoke *a*	.....	.....	.....	1.81	3.0
Husted†	80	2	48.3	1.96	14.8
Jamestown	68	12	40.1	1.01	7.0
Kit Carson*¹	86	20	56.6	.....	4.0
Lake Moraine†	58	— 8	34.8	1.30	21.5
Laporte	.....	.....	.....	1.00	
Las Animas†	86	9	51.0	1.60	
Lay†	72	12	43.1	0.40	2.0
Leadville (near)*†	62	— 5	35.9	0.30	3.0
Leroy†	82	7	48.0	1.91	6.0
Longmont†	83	2	48.1	0.85	.....
Longs Peak	68	— 8	38.2	1.00	1.8
Loveland	.....	.....	.....	1.30	.....
Manhattan	.....	.....	.....	1.92	13.0
Meeker†	74	7	42.8	0.39	1.8
Millbrook†	78	—15	45.0	0.41	10.0
Minneapolis†	90	10	57.4	1.67	
Moraine†	65	— 8	38.1	1.08	9.0
Ouray†	62	10	41.1	1.50	15.0
Pagoda†	74	— 5	42.0	0.70	7.0
Paonia†	.....	.....	.....	0.30	3.0
Parachute†	78	17	50.2	0.13	T.
Pinkhamton*¹	66	2	39.0	1.95	18.0
Pueblo	.....	.....	.....	.....	T.
Redcliff	.....	.....	.....	0.40	4.0
Rico†	64	— 1	37.6	1.30	12.0
Riverbend*§	74	14	45.6	1.20	12.0
Rockyford†	87	15	54.2	0.55	
Ruby†	.....	.....	.....	4.55	45.5
Saguache†	65	18	39.3	0 05	0.5
St. Cloud†	.....	.....	.....	1.15	11.5
San Luis†	72	8	42.8	1.84	18.5
Santa Clara*†¹	70	8	45.3	4.20	42.0
Seibert†	.....	.....	.....	3.64	8.0
Smoky Hill Mine†	74	5	37.6	1.60	16.0
Stamford*¹	60	0	35.6	5.50	55.0
Steamboat Springs †	70	—13	40.1	0.70	7.0
Sulphur Springs†	76	— 8	37.6	1.59	14.0
Surface Creek †	78	9	47.3	0.05	0.5
Thon†	87	3	48.8	1.60	10.0
T. S. Ranch†	77	10	51.9	0.07	0.5
Vilas	.....	.....	.....	2.00	0.0
Wallet†	.....	.....	.....	3.24	.....
Watkins*¹	64	28	43.6	.....	T.
Wray†	88	11	52.3	4.83	T.
Yuma	.....	.....	.....	1.82	6.0
Connecticut.					
Bridgeport	90	23	49.2	0.69	T.
Canton†	88	18	48.3	1.03	
Colchester	87	22	48.9	1.80	T.
Falls Village	.....	.....	.....	1.71	5.0
Greenfield Hill	.....	.....	.....	0.77	3.3
Hartford *b*	.....	.....	.....	0.93	T.
Hartford *c*	86	24	50.7	.....	T.
Lake Konomoc	.....	.....	.....	1.04	
Middletown	90	24	50.8	1.09	T.
New Haven	.....	.....	.....	.....	T.
New London†	80	17	46.8	1.50	T.
North Grosvenor Dale	83	19	48.0	1.21	
Norwalk	92	20	48.0	0.77	4.0
Southington*¹	86	23	49.5	1.10	T.
South Manchester	.....	.....	.....	1.04	
Storrs	85	21	48.1	0.80	
Voluntown†	85	13	48.6	1.50	.....
Wallingford†	.....	.....	.....	1.58	T.
Waterbury	86	24	50.6	1.83	T.
West Simsbury	.....	.....	.....	1.07	T.
Windsor	84	23	48.9	0.91	T.
Delaware.					
Dover†	95	30	55.6	1.18	
Milford	97	26	56.6	1.21	
Millsboro	99	22	55.2	1.59	
Newark	92	24	53.6	1.57	T.
Seaford†	95	25	56.2	1.84	T.
Wilmington†	97	29	58.1	1.37	T.
District of Columbia.					
Dist'ing Reservoir*§	89	32	57.3	0.66	
Receiving Reservoir*§	90	33	57.8	0.65	
Washington	.....	.....	.....	.....	0.1
West Washington	94	26	57.0	1.19	T.
Florida.					
Amelia†	90	40	68.0	1.30	
Archer†	94	38	71.0	1.83	
Avonpark†	94	46	72.5	0.18	
Bartow†	91	44	70.3	0.00	
Brooksville†	90	43	71.0	0.32	
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
Carrabelle†	86	43	68.8	0.40	
Clermont†	94	51	74.8	0.10	
Earnestville†	95	44	73.0	0.25	
Emerson*†¹	94	50	68.4	0.49	
Eustis†	92	45	71.7	0.26	
Federal Point†	91	41	68.4	0.08	
Fort Meade†	92	36	67.7	0.03	
Frostproof*†¹	95	51	70.7	0.09	
Grasmere†	95	46	71.4	T.	
Kissimmee†	95	45	76.6	0.24	
Lake Butler†	94	36	70.0	0.27	
Lake City†	91	44	72.4	1.03	
Lemon City†	90	53	74.5	0.10	
Macclenny †	98	38	75.6	0.37	
Manatee†	92	45	69.8	0.05	
Merritts Island†	90	52	72-8	0.20	
Milton†	.....	.....	.....	3.53	
Mullet Key†	84	51	71.4	0.04	
Myers†	90	50	72.3	0.32	
New Smyrna†	90	43	67-2	T.	
Oakhill *¹	92	59	73.2	.....	
Ocala*†§	90	50	73.1	0.78	
Orange City†	93	42	71.0	0.00	
Orangepark	91	38	69.6	0.43	
Orlando†	93	46	71.8	0.00	
Oxford*†¹	93	48	72.2	0.02	
Plant City†	94	42	70.9	1.68	
St. Francis†§	93	54*	68.8	0.07	
St. Francis Barracks	91	44	68.1	0.06	
Tallahassee†	90	44	70.7	1.32	
Tarpon Springs †	89	44	70.2	T.	
Georgia.					
Adairsville†	92	34	65.1	1.58	
Albany†	94	37	69.8	0.40	
Allentown†	97	35	72.6	1.60	
Americus†	96	36	71.4	1.54	
Blakely*†§	91	45	69.7	2.44	
Brag†	94	33	69.8	0.63	
Brunswick †	84	49	67.7	0.83	
Canton†	.....	.....	.....	1.78	
Clayton†	91	28	61.4	2.23	
Columbus†	.....	.....	.....	2.92	
Covington	92	32	66 2	2.94	
Dahlonega†	91	33	63.7	2.07	
Diamond †	91	29	61.6	2.34	
Dublin *b*†	.....	.....	.....	1.22	
Elberton†	94	38	67.2	2.23	
Fleming †	92	32	67.8	0.25	
Gillsville †	92	36	66.3	0.80	
Hephzibah*§	90	42	70.4	1.90	
Lagrange†	93	38	68.4	1.65	
Leverett†	94	35	68.5	2.99	
Lumpkin †	93	40	71.2	2.34	
Macon†	.....	.....	.....	1.73	
Marietta†	88	36	64.5	1.28	
Marshallville†	94	39	70.7	3.60	
Milledgeville †	90	40	67.8	0.71	
Monticello*†¹	95	39	68.8	1.40	
Morgan†	90	36	68.3	1.81	
Point Peter*¹	88	38	64.2	2.90	
Poulan†	91	38	68.3	0.68	
Quitman †	90	40	73.6	0.91	
Ramsey†	90	31	65.7	3.27	
Resaca †	.....	.....	.....	2.48	
Reynolds †	.....	.....	.....	2.06	
Rome †	88	35	65.0	1.91	
Talbotton†	89	35	66.7	1.70	
Thomasville†	93	40	70.0	1.92	
Toccoa†	94	32	62.8	2.54	
Washington†	90°	36	68.0°	1.28	
Whitesburg†	.....	.....	.....	1.77	
Idaho.					
American Falls †	75	16	42.4	2.23	
Atlanta†	47	7	30.8	4.81	41.0
Blackfoot †	71	14	42.4	1.50	0.5
Bliss†	76	20	44.4	2.01	
Boise Barracks†	69	23	45.4	2.72	
Burnside †	64	6	36.1	0.27	
Carriboo†	58	3	32.6	1.69	19.0
Challis	67	12	42.6	0.81	6.0
Chesterfield †	73	0	39.0	1.12	1.0
Cœur d'Alene	66	19	47.8	.....	
Corral*†¹	61	4	35.0	1.65	
Dairy †	61	15	38.1	2.02	.....
Downey†	68	14	40.8	0.74	1.5
Fort Lemhi†	71	12	41.2	0.96	.....
Fort Sherman†	68	18	43.2	1.35	T.
Fraser†	74	13	40.8	2.71	
Grangeville	61	22	40.1	2.42	8.6
Idaho City†	60	17	39.0	.....	3.7
Idaho Falls	.....	.....	.....	.....	3.3
Kootenai†	71	21	43.5	.....	.....
Lake †	50	—10	28.4	1.30	13.0
Lewiston†	78	27	51.0	1.19	
Lost River †	.....	.....	.....	0.30	0.4
Martin †	62	9	36.4	0.55	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Idaho—Cont'd.	°	°	°	*Ins.*	*Ins.*
Minidoka †	75	12	40.6	1.28	1.0
Moscow †	68	26	44.9	0.57	
Murray †	68	16	41.4	2.81	1.0
Nampa	70	22	45.9	1.26	T.
Oakley †	77	16	43.6	0.80	T.
Orchard †	68	20	44.8	2.34	
Paris †	69	4	36.2	1.91	.....
Payette †	80	22	50.3	1.74	0.1
Pollock †	75	23	48.3	1.73	
Roseberry †	54	4	36.0	1.34	5.0
Salubria †	70	21	45.2	2.98	0.9
Shoup †	.....	.....	.....	1.03	T.
Soldier †	59	0	39.8	0.79	4.0
Swan Valley †	68	— 4	39.5	1.17	3.0
Warren †	60	— 4	35.9	2.73	.....
Illinois.					
Albion †	86	27	62.4	1.23	
Alexander †	89	20	61.4	2.49	
Ashton *† [1]	84	21	55.2	3.71	T.
Atlanta	90	25	58.8	2.39	
Atwood *a* *† [2]	.....	20	55.8	1.78	
Atwood *b*	.....	.....	.....	1.24	
Aurora *a*	88	20	56.4	3.75	T.
Aurora *b* †	85	20	54.4	4.17	
Beardstown †	.....	.....	.....	3.39	
Bloomington †	88	22	60.2	2.02	6.0
Bushnell †	89	22	59.8	3.45	2.5
Cambridge †	85	22	56.4	4.55	6.0
Carlinville †	88	24	62.4	2.48	T.
Carlyle	.....	.....	.....	1.57	
Carrollton	84	25	60.1	1.86	
Catlin †	87	23	57.3	2.03	1.5
Cazenovia *† [1]	90	22	56.8	4.18	12.0
Charleston	88	24	60.8	1.30	0.1
Chemung *[1]	85	16	53.2	6.78	T.
Chester †	.....	.....	.....	2.25	
Chicago	.....	.....	.....	.....	T.
Cisne *† [1]	92	29	63.6	1.24	
Clearcreek †	90	20	56.8	4.45	
Cobden †	85	31	63.4	2.89	
Cordova †	.....	.....	.....	4.60	.....
Decatur †	87	23	61.2	1.56	
Dixon †	85	20	55.4	3.62	T.
Duquoin *[1]	89	31	64.9	2.38	
East Peoria †	88	20	59.0	3.74	
Effingham † [1]	88	24	65.2	2.40	
Evanston *[10]	89	20	52.0	.....	.....
Fort Sheridan †	85	17	50.6	3.13	T.
Friendgrove *† [1]	.....	30	58.0	2.49	
Galva †	87	20	57.0	4.24	8.0
Glenwood *† [1]	86	18	51.7	2.84	T.
Grafton †	.....	.....	.....	2.80	
Greenville †	89	25	62.5	2.26	
Griggsville †	88	20	61.8	3.05	T.
Halliday *[3]	86	37	67.6	2.17	
Havana †	87	26	61.6	3.15	1.0
Herrins Prairie *[1]	86	36	65.7	2.35	
Hillsboro *† [1]	88	25	63.8	1.98	
Iron *† [3]	88	32	63.4	1.79	
Joliet †	90	21	58.0	2.82	T.
Jordans Grove †	88	29	63.6	3.64	
Kankakee *a* †	84	24	55.8	1.98	
Kankakee *b* *[2]	85	20	54.6	.....	.....
Kishwaukee	83	13	54.2	4.15	T.
Knoxville *a* *[5]	84	22	58.2	3.62	3.5
Knoxville *b*	83	21	57.2	4.51	4.0
Lagrange †	85	20	53.9	4.21	T.
Laharpe *[1]	88	22	59.0	2.35	
Lanark *† [1]	85	21	53.9	5.05	T.
Lexington †	86	19	57.4	3.62	6.0
Loami †	.....	.....	.....	1.65	
Louisville †	86	27	62.0	1.55	
McLeansboro *† [3]	.....	31	60.7	2.00	
Martinsville †	85	27	60.2	1.92	0.2
Mascoutah *[5]	88	28	65.0	2.30	
Mattoon *[1]	82	28	57.4	.....	.....
Minonk *† [1]	86	22	56.5	3.64	6.0
Monmouth †	85	22	58.0	4.50	1.5
Morrisonville †	85	23	60.2	1.98	
Mount Carmel †	.....	.....	.....	2.25	
Mount Pulaski	86	22	59.8	2.31	
Mount Vernon	87	29	63.7	1.67	
New Burnside †	95	32	66.0	3.36	
Olney *a* *[1]	87	28	64.1	1.52	
Oregon †	85	18	54.8	3.68	T.
Oswego *[1]	85	19	53.4	3.48	
Ottawa †	88	20	56.7	3.38	T.
Palestine †	88	28	61.1	1.07	
Paris †	92	23	59.8	1.28	
Peoria *a* †	.....	.....	.....	3.87	3.0
Peoria *b* †	88	26	60.2	4.47	3.0
Philo †	88	18	58.0	1.38	
Plumhill *† [3]	92	30	61.4	2.18	
Rantoul *† [1]	87	24	56.6	1.68	6.0
Reynolds	84	30	57.0	5.34	5.0
Riley †	83	17	53.4	2.97	T.
Robinson *† [3]	88	26	58.3	1.15	
Rockford †	84	15	54.4	4.08	T.
Rose Hill *† [1]	92	30	60.3	2.11	
Roundgrove †	88	30	56.9	4.91	.....
Rushville	87	22	59.6	4.45	.....
St. Charles *† [1]	85	20	53.6	4.11	0.4
St. John *† [1]	87	30	63.9	3.19	
Scales Mound †	85	30	54.5	6.17	0.2
Streator †	86	22	57.4	2.63	0.8
Sycamore *† [1]	83	30	53.7	2.74	
Tiskilwa *† [3]	85	24	54.2	4.28	3.0
Tuscola *† [1]	87	28	59.6	1.30	T.
Walnut †	85	22	57.0	5.17	0.5
Warsaw †	.....	.....	.....	1.67	.....
Wheaton *[3]	.....	22	52.8	4.50	T.
Winnebago †	83	18	53.6	3.63	T.
Zion †	88	18	54.2	5.78	T.
Indiana.					
Anderson †	85	25	58.3	2.33	
Angola *[1]	90	21	55.4	5.91	2.0
Bloomington †	86	26	61.5	T.	
Bluffton †	88	19	56.9	5.29	
Butlerville †	90	23	61.5	0.43	
Cambridge City †	85	24	57.5	1.18	
Columbia City *[1]	84	22	55.4	2.41	
Columbus †	87	24	59.4	0.21	
Connersville †	86	25	58.4	1.27	
Delphi †	84	22	54.4	2.62	T.
Edwardsville *† [1]	88	29	64.8	0.45	
Evansville †	90	29	64.4	1.65	
Farmland †	85	25	58.6	2.20	T.
Franklin *[1]	88	29	59.5	0.97	
Greencastle †	84	25	58.5	1.06	T.
Hammond †	88	27	55.1	3.92	
Huntington	87	24	56.8	2.82	0.5
Indianapolis	.....	.....	.....	.....	T.
Jasper †	88	27	63.2	0.53	
Jeffersonville	90	30	63.7	0.24	
Knightstown †	88	23	59.9	1.66	
Kokomo †	89	21	58.4	3.22	0.1
Lafayette †	86	30	57.9	2.65	T.
Logansport *δ* †	87	25	59.7	2.80	
Madison †	89	27	63.2	0.28	
Marengo †	90	25	62.8	0.30	
Marion †	87	20	57.4	3.11	T.
Mauzy †	87	23	58.2	1.02	T.
Mount Vernon †	90	30	64.7	2.59	
Northfield †	85	22	56.9	1.73	
Princeton *† [1]	88	27	60.6	2.35	
Rockville †	88	23	59.5	1.58	T.
Rushville †	.....	.....	.....	0.92	
Scottsburg †	88	27	62.5	0.10	
Seymour †	87	25	60.4	0.25	
South Bend †	86	13	55.6	2.35	1.0
Sunman	84	24	58.8	0.55	
Syracuse †	.....	.....	.....	2.51	0.1
Terre Haute †	88	28	61.8	1.41	
Valparaiso †	87	19	54.6	3.34	T.
Vevay	91	30	63.4	0.23	
Vincennes †	93	27	63.9	0.59	
Worthington †	89	25	61.4	0.61	
Indian Territory.					
Eufaula †	.....	.....	.....	3.43	
Healdton †	96	27	67.8	1.32	
Kemp †	92	30	68.8	1.31	
Lehigh †	90	28	67.3	2.94	
Purcell †	92	22	62.6	0.78	
South McAlester †	94	26	70.6	1.50	
Tahlequah †	86	26	63.4	2.36	
Tulsa †	.....	.....	.....	1.60	
Vinita †	85	31	66.0	1.49	
Iowa.					
Afton	85	18	56.8	3.67	
Algona *[1]	84	19	51.5	6.46	3.2
Alta *a* †	81	16	50.7	8.15	1.0
Amana †	86	20	55.6	5.26	8.0
Ames *c*	.....	.....	.....	4.29	
Atlantic *† [1]	85	14	53.9	3.59	
Atlantic (near)	85	18	54.8	3.02	
Audubon	84	12	53.0	7.32	
Belknap	90	21	60.0	3.55	
Belle Plaine	87	12	53.2	4.81	3.0
Bonaparte †	86	18	58.7	3.31	
Carroll	85	12	53.0	6.43	
Cedarfalls †	85	20	51.6	7.30	6.0
Cedar Rapids †	94	21	59.2	5.23	7.0
Chariton	84	19	57.0	3.13	
Charles City †	88	17	52.9	6.55	10.0
Clarinda †	83	20	54.3	3.72	
Clinton	89	20	57.3	4.33	2.0
College Springs	87	.....	.....	4.13	
Corning †	86	18	56.5	2.84	
Cresco †	82	15	50.2	5.09	5.0
Davenport	.....	.....	.....	.....	4.5
Decorah †	85	13	52.8	5.57	
Delaware *[3]	84	20	51.7	4.81	5.0
Denison †	.....	.....	.....	6.79	
Des Moines	.....	.....	.....	.....	T.
Dows	85	13	53.3	7.21	T.
Dubuque	.....	.....	.....	.....	2.1
Elkader †	86	16	52.4	5.06	6.5
Emmetsburg	83	14	49.6	6.09	0.2
Estherville	84	14	50.2	6.13	1.5
Fairfield †	84	18	57.6	4.60	
Forest City	82	15	50.1	4.63	4.0
Fort Madison *† [1]	88	27	61.6	3.57	
Galva †	83	14	52.5	6.36	
Gardengrove	86	13	56.0	3.64	
Glenwood †	90	16	58.0	3.29	
Grand Meadow *[1]	80	16	51.2	6.32	5.5
Greenfield †	87	16	55.9	3.21	T.
Grinnell †	87	22	56.9	8.62	
Grundy Center *	84	16	52.1	7.27	3.0
Guthrie Center †	82	13	52.4	4.60	
Hampton	89	15	50.7	6.65	6.8
Hawkeye	.....	.....	.....	5.00	12.0
Hopeville †	86	18	56.7	3.30	
Humboldt †	85	15	52.9	5.55	
Independence †	84	17	52.4	5.88	4.8
Indianola †	86	20	57.7	2.69	T.
Iowa City *a* †	83	20	57.1	5.14	8.0
Iowa City *b*	86	18	55.6	.....	.....
Iowa Falls †	84	15	50.4	7.09	.....
Keosauqua †	88	21	59.4	3.17	T.
Knoxville	88	19	56 8	4.91	
Larrabee †	87	15	52.2	6.91	
Leclaire †	.....	.....	.....	3.50	
Lemars	83	12	53.8	6.69	T.
Lenox *[1]	85	24	57.4	3.30	
Logan †	88	18	53.9	7.17	
Madrid	76	14	50.7	5.10	T.
Malvern *[1]	90	14	55.8	2.87	
Maple Valley	.....	.....	.....	7.77	
Marshall †	86	10	53.4	6.82	
Mason City †	82	15	51.0	6.26	7.5
Maxon *[1]	93	24	58.9	4.43	
Mechanicsville	85	11	54.4	4.93	10.0
Millman	.....	.....	.....	3.37	
Monticello *† [1]	81	17	50.7	5.65	6.0
Mountayr †	88	15	57.2	2.83	
Mount Pleasant *[1]	83	25	58.7	5.93	
Mount Vernon *[1]	85	21	56.0	.....	12.0
Neola	92	13	57.4	3.32	
Newton †	87	18	55.6	6.92	
North McGregor †	.....	.....	.....	5.92	2.5
Northwood	82	14	50.1	5.95	8.0
Ogden	87	19	54.4	4.89	T.
Osage *† [3]	.....	21	48.4	5.68	11.0
Oskaloosa †	87	21	58.0	3.63	
Ottumwa	88	22	58.8	5.46	
Ovid †	85	17	57.0	3.48	T.
Panama †	84	17	54.0	8.16	
Portsmouth	90	16	58.2	7.17	
Primghar	81	14	51.0	5.62	1.0
Reinbeck	.....	.....	.....	6.46	6.0
Rock Rapids	92	10	46.0	4.68	
Sac City †	83	15	52.8	4.45	
Seymour †	85	18	57.6	3.79	
Sibley	82	12	48.8	5.33	3.0
Sidney	88	21	56.2	2.81	
Sigourney	87	17	57.0	5.16	
Sioux City	.....	.....	.....	.....	0.3
Spirit Lake †	81	12	49.4	4.08	
Toledo	84	15	54.6	6.26	
Villisca †	87	16	65.6	3.88	
Vinton *[1]	84	21	54.1	4.43	T.
Washington †	87	18	57.2	4.13	
Waterloo	84	19	53.5	6.65	5.5
Waukee	86	19	57.7	2.84	
Waverly	84	18	53.6	7.25	6.0
Westbend *† [1]	83	18	49.6	5.52	.....
Wilton Junction †	85	20	56.6	5.19	6.0
Winterset †	87	16	56.0	3.98	
Kansas.					
Abilene †	93	22	61.2	6.52	
Achilles *[3]	92	19	49.6	5.28	T.
Altoona *† [3]	87	29	62.8	2.22	
Assaria *[5]	94	27	60.6	3.94	
Atchison †	91	25	59.9	2.56	
Augusta	90	24	64.0	2.30	
Baker	91	23	61.0	2.71	
Beloit †	93	19	60.1	3.45	
Blaine	90	22	59.7	4.13	
Burlington †	94	24	62.8	6.09	
Campbell	93	22	59.9	4.29	
Colby †	90	8	54.0	5.11	T.
Coldwater †	92	16	62.0	3.97	
Collyer *[5]	90	25	57.4	7.25	
Columbus †	87	25	62.7	4.21	
Coolidge †	92	11	57.0	1.02	
Cunningham †	94	19	63.2	1.68	
Downs	.....	.....	.....	7.10	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Dresden *† [1]	89	10	56.8	6.48	T.
Effingham	91	22	61.8	.....	.....
Eldorado †	91	25	64.5	4.10	.....
Elgin * [1]	88	28	64.1	2.48	.....
Ellinwood * [3]	92	20	57.6	2.52	.....
Emporia †	86	26	61.6	6.05	.....
Englewood †	98	18	62.8	1.99	.....
Eureka †	.....	.....	.....	2.43	.....
Eureka Ranch †	95	11	58.1	3.69	.....
Fort Riley †	91	22	61.9	5.54	.....
Fort Scott	.....	.....	.....	4.97	T.
Frankfort	95	22	62.6	2.73	.....
Garden City †	95	14	58.8	3.51	.....
Garfield	.....	.....	.....	3.83	T.
Gibson	.....	.....	.....	4.42	.....
Girard * [1]	89	26	63.4	3.98	.....
Goodland †	.....	.....	.....	2.38	.....
Gove *† [1]	91	16	57.7	4.08	.....
Grainfield * [6]	88	15	58.3	4.22	.....
Greensburg †	92	18	62.3	4.19	.....
Grenola * [1]	86	29	62.7	1.65	.....
Halstead	84	20	60.2	3.46	.....
Hays †	97	12	58.7	4.56	.....
Horton †	90	23	60.7	2.13	.....
Hutchinson †	93	23	62.7	2.97	.....
Independence †	89	27	65.0	2.41	.....
Lawrence	96	24	61.4	3.66	.....
Lebo †	91	22	62.0	5.41	.....
Lyons	92	21	62.8	3.52	.....
Macksville †	93	18	59.6	2.50	.....
McPherson †	91	20	63.0	2.57	.....
Manhattan *b*	95	25	61.9	5.49	.....
Manhattan *c*	.....	.....	.....	5.27	.....
Marion †	89	24	63.2	5.10	.....
Meade †	97	18	65.2	2.12	.....
Medicine Lodge †	96	30	65.2	2.09	.....
Minneapolis †	93	22	60.9	3.48	.....
Morantown †	84	21	62.0	4.49	.....
Morland †	90	12	56.6	3.95	.....
Morton †	90	15	59.2	1.61	.....
Mounthope * [1]	90	27	64.0	2.68	.....
Ness City †	92	14	60.0	4.07	.....
New England Ranch †	90	14	56.7	4.74	.....
Norton †	88	12	54.5	6.71	.....
Norwich * [1]	94	28	62.6	2.19	.....
Oberlin †	.....	.....	.....	6.01	.....
Olathe †	86	25	61.8	5.26	.....
Oswego †	89	30	63.5	3.31	.....
Ottawa †	87*	22	63.6*	3.93	.....
Paola †	88	24	60.2	5.70	.....
Phillipsburg †	88	30	55.5	4.55	.....
Pleasant Dale †	96	14	59.2	3.96	T.
Pratt †	90	30	61.1	2.58	.....
Rome *† [1]	90	26	64.4	2.72	.....
Russell †	96	18	60.4	7.77	.....
Salina †	92	22	62.4	5.39	.....
Scott City †	90	12	57.9	2.90	.....
Sedan †	89	28	64.9	1.98	.....
Sharon Springs * [1]	86	18	53.1	3.00	.....
Tribune †	.....	.....	.....	3.75	.....
Ulysses †	92*	10*	57.9*	2.13	.....
Wakefield * [1]	95	30	62.4	7.50	.....
Wallace * [6]	94	18	54.1	3.37	.....
Wamego * [1]	91	26	61.5	4.04	.....
Wellington * [1]	88	30	66.1	3.18	.....
Winfield * [5]	94	24	63.4	2.44	.....
Winona * [5]	90	26	56.2	4.70	T.
Yates Center †	89	22	62.6	2.55	.....
Kentucky.					
Alpha †	91	26	65.4	1.69	.....
Anchorage †	88	29	62.9	0.17	.....
Blandville †	86	30	64.1	1.79	.....
Bowling Green *a* * [1]	88	27	62.1	3.77	.....
Bowling Green *b* †	90	30	65.4	3.67	.....
Burnside †	.....	.....	.....	1.62	.....
Caddo †	88	30	60.9	1.60	.....
Canton *† [1]	88	35	66.2	1.65	.....
Carrollton †	91	28	64.8	0.44	.....
Catlettsburg *† [1]	90	30	62.6	1.53	.....
Earlington	87	32	63.4	2.89	.....
Edmonton †	86	26	62.7	2.52	.....
Eubank †	94	23	63.2	0.94	.....
Falmouth †	.....	.....	.....	0.34	.....
Fords Ferry †	90	30	65.9	3.49	.....
Frankfort †	89	28	62.2	0.69	.....
Franklin *† [1]	89	34	66.0	2.00	.....
Georgetown	88	28	62.8	.....	.....
Greendale * [1]	89	30	62.1	1.01	.....
Greensburg *† [1]	87	30	63.1	1.25	.....
Harrods Creek †	91	29	61.0	.....	.....
Henderson †	95	32	66.8	0.80	.....
Leitchfield †	90	24	63.3	0.78	.....
Louisa † *a*	91	25	61.0	2.01	.....
Louisa *b* * [1]	96	36	67.0	.....	.....
Marrowbone †	92	26	63.6	3.94	.....
Maysville * [1]	90	32	63.6	.....	.....
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Middlesboro †	94	23	62.0	1.86	.....
Mount Sterling †	90	26	60.5	1.92	.....
Owenton †	90*	28*	65.3*	0.25	.....
Paducah *a* †	.....	.....	.....	1.77	.....
Paducah *b* †	90	35	67.4	1.82	.....
Pleasure Ridge Park †	90	27	63.4	0.13	.....
Princeton †	89	28	65.2	1.74	.....
Pryorsburg	95	38	67.0	1.76	.....
Russellville †	91	29	65.8	2.04	.....
St. John †	85	26	62.1	0.43	.....
Sandyhook †	96	24	61.6	6.82	.....
Shelby City * [1]	92	30	63.4	0.53	.....
Shelbyville †	93	26	63.3	0.38	.....
Southfork † [2]	.....	.....	.....	1.46	.....
Springfield †	89	26	62.9	0.65	.....
Williamsburg †	.....	.....	.....	1.78	.....
Louisiana.					
Abbeville	86	42	70.2	5.25	.....
Alexandria †	90	36	70.8	3.48	.....
Amite †	88	34	70.4	2.86	.....
Bastrop †	88	37	69.9	2.82	.....
Baton Rouge †	88	36	70.6	4.95	.....
Calhoun †	90	32	69.4	2.47	.....
Cameron †	91	51[c]	74.4*	1.62	.....
Cheneyville †	90	34	69.8	3.80	.....
Coushatta *b* †	89	34	69.2	6.55	.....
Covington †	86	54	70.8	0.88	.....
Davis	92	30	69.4	2.80	.....
Donaldsonville †	88	39	71.2	5.18	.....
Elm Hall	85	33	67.4	.....	.....
Emilie †	90	40	70.6	4.12	.....
Farmerville	88	33	68.8	5.00	.....
Franklin †	87	36	69.6	2.14	.....
Grand Coteau	86	41	70.4	1.19	.....
Hammond †	88	34	70.4	2.08	.....
Houma	89	35	70.3	2.81	.....
Jeanerette †	88	38	71.0	8.15	.....
Lafayette †	89	38	70.4	2.78	.....
Lake Charles †	86	45	69.1	1.66	.....
Liberty Hill	92	35	69.2	7.23	.....
Maurepas [b]	90	34	69.6	2.74	.....
Melville †	85	39	69.1	3.10	.....
Monroe †	90	38	71.2	2.66	.....
Natchitoches †	90	33	69.6	3.50	.....
New Iberia [b]	84	42	67.8	8.75	.....
Oakridge †	92	33	70.4	3.42	.....
Oberlin	89	37	69.6	2.70	.....
Opelousas †	88	36	69.6	2.21	.....
Oxford †	86	32	68.6	7.28	.....
Palmcourtville †	88	36	70.5	4.04	.....
Plain Dealing †	87	34	71.0	3.72	.....
Rayne †	90	40	70.8	1.44	.....
Ruston †	.....	.....	.....	5.45	.....
Schriever †	88	34	70.2	2.54	.....
Shellbeach †	.....	45	.....	1.78	.....
Southern University †	84	40	68.2	2.10	.....
Sugar Ex. Station †	87	40	70.5	2.63	.....
Sugartown †	87	40	70.3	4.53	.....
Thibodeaux	.....	.....	.....	2.75	.....
Venice †	87	44	67.2	1.92	.....
Wallace	87	40	70.6	3.83	.....
West End	.....	.....	.....	2.31	.....
White Sulphur Springs †	88	35	68.8	3.72	.....
Maine.					
Bar Harbor	75	18	42.6	1.19	1.0
Belfast * [6]	68	26	43.3	1.18	5.0
Cornish * [1]	74	20	43.6	1.25	9.0
Eastport	.....	.....	.....	.....	3.6
Fairfield	73	18	41.9	1.28	.....
Farmington †	80	19	45.1	2.66	10.8
Flagstaff †	72	— 1	37.3	1.45	T.
Fort Fairfield †	65	.....	.....	1.78	10.0
Gardiner	78	23	44.2	2.02	6.8
Kineo †	57	6	36.2	2.24	18.0
Lewiston	74	20	44.5	1.63	5.0
Mayfield	67[f]	16[f]	43.6[f]	2.34	24.5
North Bridgton	72	22	43.1	1.90	12.0
Petit Menan * [1]	50	25	38.8	.....	.....
Portland	.....	.....	.....	.....	6.8
West Jonesport * [1]	66	20	39.2	.....	.....
Winslow	74	17	43.2	1.74	T.
Maryland.					
Annapolis	87	32	57.8	1.25	T.
Bachmans Valley	90	25	53.7	1.63	T.
Baltimore	.....	.....	.....	.....	T.
Boettcherville * [1]	88	36	54.4	1.80	1.0
Burkittsville	95	28	57.4	2.28	.....
Cambridge †	93*	32*	59.0*	1.07	T.
Charlotte Hall †	97	25	57.8	1.03	.....
Cherryfields † [3]	.....	.....	55.4	1.02	.....
Chestertown †	87	29	54.6	1.10	.....
Collegepark	92	24	55.4	1.29	T.
Cumberland *a* †	89	26	55.2	1.88	T.
Cumberland *b*	94	30	61.2	1.99	T.
Darlington †	94*	27	56.6*	1.37	.....
Deerpark	84	12	48.3	2.04	3.0
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Easton †	93	27	56.4	1.66	T.
Ellicott City	88	30	56.8	1.50	.....
Fallston * [1]	93	30	54.4	1.36	T.
Flintstone	93	19	55.4	1.82	.....
Frederick *a*	92	27	56.0	1.27	T.
Frederick *b* [4]	92	23	56.9	.....	.....
Grantsville	87	17	51.5	2.98	6.5
Greatfalls * [5]	91	33	57.4	0.49	.....
Greenspring Furnace	91	22	55.6	1.68	T.
Hagerstown †	92	25	57.3	1.32	.....
Hancock	97	21	56.4	1.52	T.
Jewell †	94	28	57.0	1.18	T.
Johns Hopkins Hospital	94	38	55.8	.....	.....
Laurel	94	36	56.2	1.30	T.
McDonogh [4]	90	38	57.2	.....	.....
Mardela Springs †	92	25	55.5	1.54	.....
Mt. St. Marys College †	93	25	55.2	1.40	T.
New Market	93	24	56.8	1.30	T.
Pocomoke City	93	31	58.3	1.08	T.
Princess Anne	93	32	55.1	0.96	.....
Sharpsburg	93	24	55.8	1.30	T.
Solomons †	88	32	55.8	1.17	.....
Sunnyside	87	14	50.4	2.53	2.0
Western Port	92	23*	55.3	2.25	1.0
Westminster	94	26	59.7	1.16	.....
Woodstock	93	24	55.6	1.30	.....
Massachusetts.					
Adams	86	18	48.9	.....	.....
Amherst	84	21	50.0	1.02	T.
Amherst Ex. Station *b*	88	21	49.2	1.32	0.5
Andover [3]	.....	24	42.3	0.73	T.
Ashland	.....	.....	.....	1.29	.....
Attleboro	.....	.....	.....	0.98	.....
Bedford	89	22	47.6	1.32	T.
Beverly Farms	83	23	44.3	1.65	T.
Bluehill (summit)	87	21	46.5	1.32	1.5
Bluehill (valley)	87	21	46.2	1.29	.....
Boston *a*	.....	.....	.....	1.14	T.
Boston (W.B.)	.....	.....	.....	.....	0.2
Brockton *a*	89	25	47.2	1.19	.....
Brockton *b*	.....	.....	.....	0.97	.....
Brockton *c*	.....	.....	.....	1.04	.....
Cambridge *a*	90	24	48.6	1.66	.....
Cambridge *b*	91	25	47.0	1.70	.....
Chestnut Hill	87	23	48.4	1.72	0.5
Clinton	.....	.....	.....	0.80	.....
Cohasset	.....	.....	.....	1.48	.....
Concord †	88	22	46.5	1.59	0.1
Dudley [1]	93*	18	49.0	0.90	.....
East Templeton * [1]	90	20	46.4	0.25	1.0
Egg Rock, Nahant	77	21	43.4	.....	.....
Fallriver	84	24	49.0	1.20	1.0
Fiskdale	.....	.....	.....	0.87	.....
Fitchburg *a* * [1]	92	23	46.4	1.05	.....
Fitchburg *b*	87	21	47.3	1.16	0.2
Framingham	86	22	48.6	1.85	.....
Groton	85	20	46.3	1.85	1.5
Hadley	97	18	47.2	1.74	.....
Hingham	.....	.....	.....	1.28	0.2
Hobbs Brook	.....	.....	.....	1.48	.....
Hyannis *† [1]	77	26	46.8	0.84	1.0
Hydepark * [6]	.....	24	45.3	.....	.....
Lake Cochituate	91	20	48.8	1.60	.....
Lawrence	87	22	48.3	1.09	.....
Leeds	85	19	45.6	1.87	T.
Leicester Hill	84	18	46.9	0.62	T.
Leominster	.....	.....	.....	1.21	1.0
Long Plain * [6]	84	26	48.4	1.07	.....
Lowell *a*	83	23	47.0	1.34	.....
Lowell *b*	88	18	45.9	.....	.....
Lowell *c*	90	23	48.9	.....	.....
Ludlow Center	84	19	44.6	1.40	.....
Lynn *b*	83	24	46.4	.....	.....
Mansfield * [1]	85	23	45.8	1.27	0.5
Middleboro	86	19	46.0	0.98	0.5
Milton	82	22	46.6	1.57	1.5
Monroe	76	10	40.6	1.52	6.0
Monson	87	19	49.0	1.75	T.
Mount Nonotuck	.....	.....	.....	1.43	1.0
Mount Wachusett	.....	.....	.....	1.35	3.0
Mystic Lake	.....	.....	.....	1.99	.....
Mystic Station	.....	.....	.....	2.00	.....
Nantucket	.....	.....	.....	.....	T.
Natick * [1]	81	24	46.4	2.07	0.8
New Bedford *a*	80	23	45.8	1.24	.....
New Bedford *b*	83	24	46.2	1.23	0.5
Newton Center * [3]	.....	23	43.3	.....	1.0
North Billerica	84	24	47.2	1.25	T.
Pittsfield	81	18	46.2	1.30	.....
Plymouth * [1]	86	29	47.6	0.88	T.
Princeton	.....	.....	.....	1.80	1.8
Provincetown	75	25	45.9	.....	.....
Quinapoxet	.....	.....	.....	1.27	T.
Roberts Dam	.....	.....	.....	1.79	0.8
Roxbury	83*	24*	48.4*	1.65	T.
Salem	.....	.....	.....	1.70	1.5

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Massachusetts—Con'd.	°	°	°	*Ins.*	*Ins.*
Salisbury				1.45	T.
Somerset *1	88	23	48.3	1.29	1.0
South Clinton				1.89	
Springfield Armory	88	18	47.9	0.85	
Sterling				1.66	T.
Taunton *b*	85	23	48.0	1.28	T.
Taunton *c*	85	19	46.7	1.30	
Turners Falls	84	20	48.3	1.06	
Vineyard Haven					T.
Wakefield †	84	23	47.2	1.69	T.
Waltham				2.15	
Webster				1.19	
Westboro †	88	20	50.1	1.34	0.5
Williamstown *1	81	21	47.1	0.79	0.2
Winchendon				1.57	2.0
Winchester				1.56	
Woods Hole					0.7
Worcester *a*	85	17	47.9	0.80	T.
Worcester *b*	81	22	48.0	1.23	T.
Michigan.					
Adrian	88	20	53.4	4.80	T.
Allegan	86	15	53.4	2.34	T.
Alma	85	17	50.1	3.91	1.0
Alpena					1.8
Ann Arbor	84	18	51.8		0.2
Arbela	83	20	50.6	3.59	T.
Ball Mountain	86	16	49.4	2.62	
Baraga	76	— 3	39.2	3.52	7.0
Battlecreek	87	16	52.2	3.48	1.5
Bay City	84	19	50.0	2.54	T.
Benton Harbor	84	18	53.7	4.25	
Benzonia	78	12	48.0	3.66	1.0
Berlin *1	92	19	51.1	2.76	0.2
Berrien Springs	86	18	53.8	2.50	T.
Big Rapids	79	12	49.0		
Birmingham	90	20	51.5	1.91	
Boisblanc *10	82	18	49.3		
Boon	80*	12*	46.4*	2.40	
Bronson	90	16	53.9	2.36	
Calumet	63	7	39.5	4.02	8.5
Charlevoix	81	20	47.4	2.80	0.5
Cheboygan	76	11	43.2	2.73	5.0
Clinton	88	18	53.0	3.22	
Detroit					0.1
Fairview	86	14	48.4	2.00	T.
Fitchburg	89	14	50.8	4.08	2.0
Flint	86	3	50.6	3.14	0.5
Gaylord	86	9	45.9	1.31	3.0
Gladwin	84	18	50.2	2.43	2.0
Grand Haven					0.6
Grand Rapids *a*	86	16	53.1	3.41	0.8
Grand Rapids *b*	84	15	52.7	2.67	T.
Grape	85	20	53.0		
Grayling	87	10	46.5	2.07	7.0
Hanover	85	17	52.2	3.07	1.0
Harrison	84	11	48.3	3.35	4.5
Harrisville	83	12	43.2	2.29	3.4
Hart	82	10	51.0	3.35	
Hastings	82	18	53.5	2.72	0.5
Hayes	84	18	49.2	1.25	
Hesperia	83	14	49.6	3.07	0.2
Highland Station	85*	16*	53.4*	4.09	T.
Holland *10	78	21	46.2		
Howell	87	18	51.6	4.17	T.
Iron River	80	— 7	40.2	4.29	
Ivan	85	14	48.2	2.45	7.0
Jeddo	87	13	48.0	2.68	T.
Kalamazoo	85	6	47.3	2.30	3.0
Lake City	78*	15*	46.7*		
Lansing	85	16	51.1	2.05	T.
Lathrop	72	8	40.7	3.40	3.0
Lewiston	90	11	47.0	2.66	0.9
Ludington *10	80	22	51.6		
Madison	89	19	53.0	3.81	0.6
Manistique	61	11	38.2	2.39	5.0
Marquette					3.9
Mayville	83	18	50.8	2.89	2.0
Middle Island *10	70	17	43.0		
Mottville	88	17	54.0	2.26	2.0
Mount Pleasant	83	18	49.8	3.68	2.0
North Mainton Island *10	75	15	45.0		
North Marshall *		13	53.0	3.46	0.5
Northport	80	17	45.1	4.70	8.0
Old Mission	81	15	48.4	2.57	5.0
Olivet	83	15	52.4	4.73	0.5
Ovid	82	19	51.2	2.60	T.
Owosso	86	16	50.2	3.32	0.1
Parkville				3.09	1.0
Point Aux Barques *10	84	18	47.0		
Pontiac	84	19	50.8	2.88	T.
Port Huron					0.5
Powers	79	9	44.0		3.0
Rockland	84	7	43.6	5.10	13.0
Rogers City	83	13	41.8	2.07	
Romeo	87	19	50.8	1.60	T.
Saginaw				2.22	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Ignace	65	8	39.0	3.17	3.0
St. Johns	85	16	51.8	2.10	
Sandbeach *a* *		15	47.1	1.49	
Saranac	84	15	51.6	2.50	0.5
Sault Ste Marie					1.0
Somerset	84	13	52.6	3.36	0.2
South Haven	83	17	50.8	2.35	0.5
Stanton	83	14	50.0	4.34	0.5
Thornville	87	20	52.2	3.77	2.5
Three Rivers	87	18	56.0	3.34	0.2
Thunder Bay Island *10	62	16	41.9		
Two Heart River *10	74	10	41.8		
Vandalia	86	15	54.2	2.77	1.5
Watersmeet	78f	11f	49.4f	2.75	5.0
Ypsilanti	88	15	50.8	3.80	T.
Minnesota.					
Adat	79	12	42.4	4.10	0.5
Albert Lea †	81	15f	48.8*		4.2
Alexandria *a* †				9.23	16.0
Beardsley †	77	15	42.6	6.51	1.0
Belleplaine *1	75	18	46.6		1.3
Bermidji †	79	3	42.4	3.34	2.4
Bird Island	79	5	45.2	6.53	8.2
Blooming Prairie †	80	13	49.7	5.70	7.0
Bonnjwell †	80	5	45.2	4.95	
Breese †	73	7	38.8	4.82	4.0
Caledonia †	80	15	50.7	7.32	3.0
Cambridge †	79	3	43.9	6.14	9.0
Camden †	82	11	46.2	11.93	6.0
Campbell	78	12	43.2		
Collegeville	84	12	46.0	5.57	6.9
Crookston †	75	10	40.8	5.23	6.0
Dawson *1	68	— 4	40.8	9.06	9.5
Detroit City †	80	9	43.0	2.92	2.5
Duluth					12.0
Farmington †	80	12	46.4	5.41	11.0
Fergus Falls †	77	14	42.6	6.84	5.5
Glencoe †	79	6	46.4	5.85	
Glenwood †	82	9	44.6	8.71	5.0
Grand Meadow †	81	11	47.4	6.47	10.0
Grand Portage †	61	—22	33.3	5.08	
Granite Falls †	80	— 1	46.4	8.04	14.0
Hutchinson †	80	9	46.4		
Koochiching † *	76	25	39.4	1.91	3.0
Lake Winnibigoshish *1	71	8	38.0	4.55	8.7
Lambert †	73	8	39.6	6.55	5.5
Lawrence †				8.57	13.0
Leech Lake [1]	73*	—13	37.9	5.25	8.0
Long Prairie †	81	1	42.6	7.20	14.2
Lutsen †	55	6	36.2	5.36	
Luverne †	80	13	49.0	4.90	
Mapleplain	79	10	46.0	5.80	7.8
Maplewood *1	77	15	44.2		13.5
Mazeppa [1]	74*	14	49.2	2.50	5.0
Milan †	77	6	44.8	6.15	4.2
Minneapolis *a* †	81	11	47.1	5.22	7.6
Minneapolis *b* *	78*	10	46.4	5.11	6.8
Minneapolis (W. B.)					7.4
Minnesota City †	84	16	51.4	5.82	3.0
Montevideo †	79	31	47.3	7.33	4.5
Moorhead					8.3
Morris †	76	14	45.2	8.12	9.0
Mount Iron †	75	— 3	39.6	5.60	12.0
New London	80	10	43.8	10.30	7.0
New Richland *14	80	14	48.0		
New Ulm †	82	14	49.4	5.12	1.5
Park Rapids †	74*	— 1*	38.7*	4.94	6.4
Pine River *1	73	3	40.2	6.56	10.0
Pleasant Mounds †	83	14	49.5	5.32	1.2
Pokegama Falls [1]	74*	—16	36.5	5.66	10.0
Redwing †				4.56	
Reeds †				6.59	
Rolling Green †	78	16	48.7	4.20	6.0
Roseau †	73	4	37.2	4.34	2.3
St. Charles †	81	15	50.0	7.84	8.0
St. Cloud	76	5	41.7	6.31	15.0
St. Olaf	79	13	42.6	6.36	8.0
St. Paul					13.4
Sandy Lake Dam [1]	67*	— 5	39.3	6.65	6.0
Sauk Center	79	0	42.4	8.09	3.0
Shakopee *	76*	15	47.9	5.67	8.5
Tower †	78	— 8	38.4	2.70	14.0
Two Harbors †	59	7	38.8	3.44	4.5
Wabasha *1	84	17	49.3	6.58	6.5
Willmar †	75	9	44.6	7.43	4.0
Winona	80	15	48.8	6.41	T.
Worthington	79	11	47.4	5.94	0.2
Zumbrota [1]	80*	11*	49.4		
Mississippi.					
Agricultural College	87	39	69.1	4.21	
Austin †	85	39	70.0	4.80	
Batesville †	87	33	67.7	5.57	
Bay St. Louist	85	43	70.5		
Biloxi †	89	40	71.7	1.15	
Booneville †	89			2.76	
Briers †	86	38	69.2	7.27	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Mississippi—Cont'd.	°	°	°	*Ins.*	*Ins.*
Brookhaven †	90	33	69.6	4.74	
Canton †	87	41	69.9	2.64	
Clarksdale †	89	36	68.4	3.31	
Columbus *a* †				4.82	
Crystal Springs †	90	38	70.9	4.53	
Edwards	91	36	71.7	2.86	
Enterprise †	91	32	71.6	4.94	
Fayette †	90	34	71.0	5.69	
French Camps †	91	31	68.2	3.66	
Fulton †	92	32	67.7	4.34	
Greenville *a*	87	41	69.8	2.30	
Greenville *b* †	86	35	68.0	2.48	
Holly Springs †	88	31	68.0	3.56	
Jackson †	90	35	70.6	4.67	
Kosciusko †	89	34	69.2	3.89	
Lake †	85	33	69.2	3.99	
Leaf *1	88	40	67.4		
Leakesville †	89	36	68.8	2.26	
Logtown †	86	39	70.6	2.90	
Louisville †	88	34	66.4	4.53	
Magnolia †	92	34	70.9	3.35	
Mico †	90	32	69.4	6.45	
Mosspoint †	86	43	71.2	3.60	
Natchez †	88	35	69.6	4.50	
Palo Alto †	89	40	69.2	3.18	
Pontotoc †	89	36	68.6	2.75	
Poplarville †	93			4.01	
Port Gibson †	88	35	70.0	3.21	
Rosedale †	96	35	70.2	2.44	
Stonington *1	86	40	70.6		
Thornton †	88	40	71.4	4.14	
Topton *5	88	44	72.4	4.95	
University †	89	33	68.4	3.64	
Vaiden †	93	33	70.8	3.56	
Water Valley *†1	92	33	68.0	2.91	
Waynesboro *a* †	90	32	66.1	2.56	
Williamsburg				10.64	
Woodville †	86	39	69.4	8.22	
Yazoo City †	94	34	72.0	3.52	
Missouri.					
Akron				2.99	
Appleton City †	89	22	61.0	5.41	
Arlington †				4.21	
Arthur *†3		30	60.6	6.02	
Bagnell †				2.15	
Bethany	87	17	59.0	2.72	
Birchtree	87	26	64.6	3.22	
Boonville †				7.42	
Brunswick	88	24	62.6	2.36	
Carrollton †	88	26	61.2	3.65	
Cedargap *1	86	28	61.8	3.45	
Conception	85	26	57.9	2.86	
Cowgill *5	86	22	59.9	3.30	
Darksville †	88	28	59.2	3.10	
Downing				2.73	
East Lynne *3		24	57.2	5.83	
Edgehill *5	84	32	64.3	2.30	
Eightmile *1	84	22	59.7	5.98	
Eldon *1	90	26	64.4	2.05	
Elmira	90	18	61.1	3.27	
Emma *3		30	63.6	4.12	
Fairport				2.08	
Farmersville				3.92	
Fayette	90	25	63.0	3.39	
Fulton				3.18	
Gallatin *1	85	25	59.8	3.57	
Gayoso *3		38	63.4	2.20	
Gordonville *3		32	62.6	2.02	
Gorin *3	90	34	58.1	3.13	
Grovedale	90	22	63.8	3.64	
Halfway	88	25	63.4	4.29	
Harrisonville †	89	23	62.2	4.49	
Hastain	92	22	62.8	2.73	
Hermann †				3.14	
Houston	87	23	64.8	3.97	
Houstonia (near)				3.72	
Irena				2.81	
Ironton *†1	84	34	63.5	4.65	
Jefferson City †	91	27	64.8	3.15	
Kidder	88	18	58.9	3.71	
Lamar	87	28	63.0	5.95	
Lamonte				4.45	
Lebanon	87	27	63.8	5.01	
Lexington †	89	34	61.7	3.00	
Liberty	90	24	63.6	3.40	
McCune *†1	88	25	61.3	3.08	
Macomb				5.31	
Mansfield				4.65	
Marblehill	87	24	63.7	3.08	
Marceline	96	30	60.2	3.54	
Marshall †	90	30	60.2	3.68	
Maryville *4	85	22	54.5	2.86	
Mexico †	91	23	61.8	2.23	
Miami				2.96	
Mine La Motte †	85	27	63.6	3.11	
Mineralspring	88	29	65.4	5.24	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Montreal *1	86	31	62.5	2.51	
Mount Vernon	86	20	59.6	5.21	
Neosho	91	20	64.8	3.62	
Nevada				3.59	
New Haven *1	88	32	67.9	1.91	
New Madrid	89	33	67.4	3.50	
New Palestine *†1	88	31	64.5	4.53	
Oakfield†	88	27	64.5	1.78	
Oakmound				3.57	
Oakridge				1.40	
Olden†	85	27	64.6	4.33	
Oregon *a*	92	24	61.6	3.17	
Oregon *b* *1	90	23	59.0	2.86	
Osceola†				3.75	
Oto				5.31	
Palmyra *§	88	30	61.4	2.40	
Phillipsburg *†1	85	27	62.6	4.59	
Pickering *‖		24	58.2	2.91	
Platte River *§	86	18	58.9	2.33	
Poplarbluff	88	30	66.4	4.77	
Potosi	87	20	62.1	2.58	
Princeton *1	90	21	59.2	3.59	
Rhineland	87	21	63.3	2.88	
Richmond *1	87	26	61.6	2.28	
Rolla				3.72	
St. Charles	90	26	63.2	1.96	
St. Joseph†				2.89	
St. Louis	87	27	62.7	2.61	
Sarcoxie *§	90	26	62.4	4.50	
Shelbina				7.10	
Sikeston	90	32	66.8	4.05	
Steffenville				2.75	
Stellada†	90	20	61.0	3.47	
Sublett	87	19	59.4	4.57	
Tindall†				1.11	
Trenton	83	22	50.1	3.03	
Unionville†	87	23	53.1	4.77	
Virgil City				3.21	
Warrenton	87	24	63.2	1.68	
Wheatland				5.26	
Willow Springs	87	24	63.6	5.88	
Zeitonia *‖	89	30	61.5	3.44	
Montana.					
Agricultural College	67	5	39.0	1.44	6.0
Bigtimber†	74	14	43.2	1.73	14.0
Billings†	90	17	48.1	0.63	5.8
Bozeman†	75	3	39.6	1.45	14.5
Butte†	59	2	34.7	0.55	6.7
Chinook†	80	10	43.4	1.40	11.0
Choteau†	73	6	38.2	1.05	10.0
Cokedale† °	71	2	37.6	1.30	12.0
Columbia Falls†	69	20	43.0	0.53	T.
Deerlodge†	66	7	38.7	0.90	2.5
Dillon†	65	0	37.4	0.50	5.0
Fort Custer†	78	2	43.1	5.02	5.2
Fort Keogh†	78	18	43.8	1.57	.....
Fort Logan†	67	— 7	36.4	0.26	.....
Fort Missoula	67	16	39.4	0.65	0.8
Glasgow†	71	— 2	41.2	3.28	.....
Glendive†	85	18	46.2	1.60	16.0
Greatfalls†	71	10	43.0	1.29	9.5
Havre					6.1
Helena				11.4	
Hogan†	64	— 5	35.4	2.35	21.0
Kipp†	73	2	36.6	1.41	13.2
Lewistown†	70	— 9	35.6	3.90	33.0
Libby†	75	13	45.6	0.89	T.
Livingston†	72	9	41.6	0.70	5.9
Manhattan†				1.90	.....
Martinsdale†	67	— 2	37.6	2.80	22.0
Marysville†	61	3	35.6	1.33	14.5
Miles City					1.0
Musselshell†	85	6	40.6	1.10	11.0
Poplar†	81	10	39.5	2.41	20.4
Radersburg†				2.52	23.8
St. Ignatius Mission†	68	23	45.0	0.65	3.0
St. Pauls†	70	— 1	36.2	4.10	11.0
Sun River†	73	5	39.3	0.60	6.0
Troy†	72	18	45.4	1.45	T.
Utica†	71	— 1	38.6	0.20	2.0
Virginia City†	64	9	37.3	2.15	19.0
White Sulphur Springs†	67	— 7	38.0	1.07	12.0
Yale†	72	7	36.4	2.36	20.0
Nebraska.					
Agee *1	87	20	49.2	5.50	
Albion†	88	28	52.8	8.27	T.
Alliance				0.80	2.0
Ansley†	85	17	51.4	4.66	
Arapaho				3.20	
Arborville *1	88	22	53.2	10.66	
Arcadia	94	20	50.1	5.22	
Ashland *a*†	91	12	56.8	2.97	T.
Ashland *b* *1	94	23	53.8	3.00	
Ashton	86	20	52.9	5.76	T.
Auburn *†1	92	20	60.0	2.68	
Aurora *1	89	24	53.6	9.98	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bassett	89	8	49.4	3.91	T.
Beatrice†	92	23	58.3	2.08	
Beaver City†	88	20	56.5	4.98	T.
Benkelman *1	84	20	52.1	3.53	
Bluehill *1	90	20	52.3	8.38	
Bratton *1	89	22	57.0	2.29	
Brokenbow *1	85	20	52.8	6.10	
Burchard				2.65	
Burwell *1	84	20	50.4	3.85	T.
Callaway†	82	21	49.4	5.69	T.
Central City *§	90	23	57.0	7.55	
Chester *1	90	24	56.6	3.78	
Columbus†	89	20	55.4	6.78	
Cook	92	24	59.7	3.23	
Creighton *†1	90	18	50.3	8.00	
Crete	90	23	57.5	4.41	
Culbertson				4.38	
Curtis *a*†	88	24	53.8	5.85	
Curtis *b*	95	15	55.2	6.00	
David City *†1	86	20	54.2	10.25	
Divide *1	84	22	52.7	4.89	
Dunning *1	86	19	49.6	6.43	T.
Edgar *1	88	24	56.2	6.00	
Elba				8.51	
Elwood				4.57	
Ericson *†1	90	20	52.2	6.20	
Ewing†				8.74	
Fairbury†	89	24	59.0	2.34	
Fairmont *1	88	23	56.2	7.76	
Fort Robinson	82	7	47.5	0.65	5.0
Franklin†	90	20	55.8	6.87	
Geneva†	93	20	57.6	7.11	T.
Genoa†	86	23	53.4	7.57	
Gering†	88	7	48.0	0.66	T.
Gibbon	84	9	54.0	6.34	
Gothenburg	89	27	54.7	6.81	
Grand Island *a* *1	90	25	57.3	9.71	
Grand Island *b*	85	21	53.2	9.38	
Greeley				7.50	1.0
Haigler *1	84	12	53.6	2.67	2.0
Hartington†	84	15	48.8	5.68	1.0
Harvard *1	90	22	54.3	9.27	
Hastings *1	87	20	51.1	9.26	1.0
Hays Center†				3.43	
Hay Springs†	84	9	44.0	3.22	1.5
Hebron†	95	22	58.0	3.52	
Hickman				1.85	
Holdrege *a*				5.80	
Holdrege *b*	87	22	56.0	7.50	
Imperial *a*†	87	10	50.9	4.30	
Imperial *b* *1	86	20	56.0	3.25	1.0
Indianola *§	88	20	54.8	3.70	
Kearney *1	90	28	53.9	4.96	
Kennedy†	89	10	47.2	2.82	2.0
Kimball†	81	6	46.4	1.75	15.0
Kirkwood *1	86	10	45.7	3.62	T.
Lexington†	82	15	51.2	4.66	
Lodgepole†	84	9	47.0	1.73	12.0
Loup *a* *1	83	24	54.9	5.50	
Loup *b* *1	86	20	55.4	7.11	
Lynch *†1	88	20	50.8	6.45	
Lyons				8.25	
McCook *1	84	20	53.9	4.96	
McCool *‖				8.77	
Madison *1	90	20	50.3	7.23	
Madrid *†§	90	15	51.2	4.13	
Marquette				7.30	T.
Milford *§	88	24	55.7	4.33	
Minden *a* *1	85	20	54.2	10.82	
Minden *b*				8.23	T.
Nebraska City *a*†	90	24°	57.8	2.48	
Nebraska City *b* *1	90	25	60.1	2.86	
Nemaha City *1	93	20	59.8	3.93	
Nesbit†	85	15	47.0	3.59	
Norfolk†	82	12	50.8	5.92	1.0
Norman†	87	31	59.1	7.69	
North Loup†	87	19	51.4	7.25	
North Platte					T.
Oakdale†	89	18	50.7	6.94	0.1
Odell *§	89	26	60.2	2.64	
Omaha (W. B.)					T.
O'Neill *1	85	22	50.0	6.86	
Ord	86	18	52.8	4.37	
Osceola				9.52	
Ough†				2.58	
Palmer *a* *1	90	20	51.3	7.55	.....
Palmer *b*				6.71	1.0
Plattsmouth *a*†				2.87	T.
Plattsmouth *b* *1	85	21	61.3	2.80	
Potter *1	81	16	45.8	1.71	
Ravenna *a*	86	20	54.0	5.72	
Ravenna *b* *1	83	22	54.6	5.54	
Redcloud *a*				5.31	
Redcloud *b* *1	86	24	56.8	6.63	
Republican *1	90	22	57.6	7.17	
Rulo *1	90	26	60.8	3.46	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Paul *a* *§	88	20	54.6	7.66	
St. Paul *b*				7.23	
Salem *1	88	30	62.1	2.66	
Santee Agency†	91	17	52.0	5.59	
Schuyler				8.05	
Seneca *1	87	14	50.0	6.75	2.0
Seward *§	87	22	57.5	4.69	
Spencer				7.91	
Springview	86	13	49.6	4.47	
Stanton *1	86	20	50.8	5.83	T.
State Farm	93	18	57.8	3.99	
Strang *1	90	25	59.8	5.38	
Stratton				3.85	
Stromsburg				9.34	
Superior *§	90	22	58.5	5.86	
Sutton	89	22	54.2	9.84	
Syracuse				2.40	
Tecumseh *a*†	91	23	59.2	2.44	
Tecumseh *b*				1.89	
Tekamah	87	14	54.8	7.00	T.
Thedford *1	90	16	48.3	4.10	1.0
Turlington†	90	21	58.0	2.91	
Valentine†	86	9	47.3	3.06	
Wakefield				5.60	.....
Wallace				4.59	2.0
Weeping Water *1	93	14	55.6	2.85	
Whitman *1	80	10	43.8	1.02	0.2
Wilber *1	96	24	59.6	3.16	.....
Wilsonville *1	94	14	53.6	6.70	
Wismer				7.02	
Woodlawn				5.00	
York *1	94	34	66.8	11.22	.....
Nevada.					
Austin	61	12	36.2	1.41	13.0
Battle Mountain *1	75	28	44.0	0.55	0.5
Beowawe *1	70	21	41.4	0.15	1.5
Candelaria ‖	70	18	42.8	0.35	3.0
Carlin *1	71	13	38.2	0.29	2.2
Carson City	67	16	39.7	1.47	2.2
Carson City (W. B.)					6.8
Cloverdale *1	68	26	41.8	0.02	0.5
Clover Valley†				2.10	6.0
Cranes Ranch				1.40	.....
Darrough Ranch				1.00	3.5
Downeyville	78	22	47.6	0.81	1.0
Elko *§	65	20	40.8	1.16	4.0
Elko (near)	69	10	41.4	0.50	2.0
Ely	65	10	37.2	2.25	19.5
Empire Ranch†	68	15	40.9	2.33	26.5
Fenelon *1	64	14	38.0	1.45	8.5
Golconda *§	60	26	43.9	0.88	1.5
Halleck *§	62	20	39.0	0.80	5.0
Hamilton	79°	7°	40.5°	2.66	26.8
Hawthorne *a* *§	68	29	47.3	0.78	1.0
Hawthorne *b*	71	18	45.4	0.16	1.0
Hot Springs *1	70	20	40.9	0.60	6.0
Humboldt *1	70	20	43.6	0.86	4.8
Keysers Springs				2.10	1.0
Los Vegas	79	26	51.9	T.	
Lewers Ranch	65	17	40.0	3.99	17.4
Lovelock *§	68	25	49.2	0.07	0.7
Mill City *§	62	28	48.2	0.40	3.0
Osceola†	66	13	41.0	0.60	5.0
Palisade *1	67	18	40.5	0.80	2.0
Palmetto	69	5	37.8	0.50	
Paradise Valley	66	13	40.0	0.29	T.
Reese River				1.72	.....
Reno *§	62	32	44.8	4.60	3.5
Reno State University	66	14	37.2	1.31	0.2
Ruby Valley†				1.53	13.2
St. Clair	72	15	43.2	0.06	
St. Thomas	89	28	61.4	0.00	
San Antonio	75	10	44.3	0.07	1.0
sodaville	73	20	45.2	0.05	
Stofiel	62	— 9	32.8	2.45	15.5
Sunnyside	70	2	41.1	0.52	
Tecoma *§	68	18	45.0	0.30	2.5
Toano *1	66	22	40.5	1.05	7.0
Tuscarora	57	17	35.6	2.12	5.5
Tybo	65	10	39.6	0.47	5.0
Verdi *§	61	22	41.4	3.66	12.0
Wadsworth *1	72	10	38.8	0.35	3.0
Wells	68	17	41.0	0.20	2.0
Winnemucca					9.8
New Hampshire.					
Alstead *§	80	18	48.4	1.18	2.5
Belmont				1.39	.....
Berlin	76	7	40.2		
Berlin Mills	77	7	40.6	1.80	13.0
Bethlehem	76	14	42.8	1.25	11.0
Brookline *1	86	20	46.3	1.05	T.
Concord	83	21	46.5	1.02	3.0
Durham	84	20	44.0	0.98	T.
Grafton†	83	16	43.6	0.99	6.0
Hanover	79	20	44.1	0.83	5.0
Keene	84	18	46.0	1.45	1.5

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Hampshire—Con'd.	°	°	°	*Ins.*	*Ins.*
Lakeport				1.31	
Lancaster	76	14	41.8	1.32	10.0
Mine Falls				0.92	
Nashua	88	20	47.1	1.00	0.5
Newton	85	22	48.5	1.32	T.
North Conway	78	18	43.8	1.46	8.0
Pennichuck Station				1.10	
Peterboro	84	16	52.2	0.62	
Plymouth	82	15	42.5	0.94	4.0
Sanbornton†	80	17	44.2	1.02	6.0
Stratford	80	12	45.0	1.21	11.0
Warner				0.94	
Weirs Bridge				1.08	
West Milan	77	4	39.6	2.66	21.0
Wolfboro				0.90	
New Jersey.					
Allaire	94	20	52.2		
Asbury Park	90	32	52.0	1.77	1.0
Barnegat	98	26	53.2	1.25	T.
Bayonne	93	24	52.4	1.51	8.5
Beachhaven	83	28	49.8	1.17	T.
Belvidere	95	21	53.2	1.39	1.5
Beverly†	96	26	55.4	1.34	T.
Billingsport *1	90	30	53.0	1.18	
Blairstown	92	21	51.0	1.12	1.0
Boonton	92	20	52.3	2.26	6.0
Bridgeton	93	30	56.7	1.11	
Camden	93	28	55.2	1.17	T.
Cape May	87	31	51.1	0.66	
Cape May C. H.†	88	29	52.5	0.98	
Charlotteburg	90[b]	25[b]	54.9[b]	0.69	5.0
Chester	88	20	50.6	1.41	6.5
College Farm†	91	25	53.2	1.41	0.8
Deckertown	91	20	51.9	0.80	3.5
Dover	92	20	51.6	0.64	3.0
Egg Harbor City	93	28	52.6	1.25	T.
Elizabeth†	96	23	53.0	2.30	18.0
Englewood	92	13	49.2	1.62	8.6
Franklin Furnace	90	18	50.8	0.89	6.0
Freehold	88	20	51.8	1.22	
Friesburg				1.33	0.3
Gillette	92	12	49.9	0.97	2.5
Hanover	90	22	51.1	1.02	4.5
Hightstown	94	25	54.6	1.63	1.0
Imlaystown	93	24	54.6	1.38	2.5
Junction				1.54	5.2
Lambertville	94	25	53.4	1.67	T.
Millville	98	23	55.2	0.89	T.
Moorestown	94	26	55.2	1.25	T.
Newark *a*	90	24	53.2	1.22	6.0
Newark *b*†	93	24	52.9	1.27	5.5
New Brunswick *a*	95	24	55.2	1.53	T.
New Brunswick *b*	91	24	51.4	1.80	
Ocean City	87	27	48.2	1.05	T.
Oceanic	91	25	54.1	2.09	4.0
Paterson	98	26	54.7	1.09	8.0
Plainfield	96	22	53.1	1.28	0.4
Rancocas				1.11	0.5
Readington *c*	94	28	56.0		
Rivervale	93	13	50.8	1.71	14.0
Somerville	95	21	53.5	1.19	T.
South Orange	91	23	52.0	1.47	7.5
Staffordville				1.98	0.2
Toms River	96	21	52.0	1.62	1.5
Trenton	91	30	56.6	1.62	T.
Vineland	97	25	55.0	1.21	
Woodbine	95	32	54.8	1.15	T.
New Mexico.					
Albert†	84	22	55.6	1.02	T.
Albuquerque†	79	13	54.7	T.	
Alma†	83	19	52.2	0.06	T.
Aztec†	77	15	49.2	0.05	T.
Bernalillo†	84	14	51.5	0.00	
Chama†	74	15	43.4	2.30	23.0
Clayton†	86	20	57.2	2.68	4.0
Deming *e*	88	35	62.3	0.30	
East Lasvegas†	74	12	50.2	1.09	9.0
Eddy†	92	31[e]	65.6[e]	0.00	
Engle†	87	22	56.6	0.00	
Espanola†	78	10	50.8	0.50	
Fort Bayard	78	15	51.3	T.	T.
Fort Wingate	73	9	46.1	0.90	9.0
Gallisteo†	89	15	53.6	0.60	
Gallinas Spring†	84	16	55.6	0.52	3.0
Gila	86	25	57.2	0.01	T.
Hillsboro†	86	21	57.2	T.	
Labelle†	64	− 6	37.8	1.30	20.5
Las Cruces†	87	23	56.3	0.11	
Lordsburg *e*	80	35	61.7	0.00	
Los Lunas†	87	10	52.1	0.00	
Lower Penasco†	88	21	58.0	T.	
Monero†	71	5	42.6	0.44	4.0
Ocate†	75	7	46.5	0.75	7.0
Olio†	82	11	52.6	T.	T.
Puerto de Lung†	86	21	60.6	0.15	1.5
Raton†	80	11	50.5	2.06	14.0
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rincon†	92	27	60.9	0.08	
Roswell†	94	22	61.7	T.	
San Marcial†	87	21	57.7	0.00	
Santa Fe					10.8
Shattucks Ranch	84	19	54.1	0.01	0.1
Springer†	87	4	49.6	0.27	T.
Valley Ranch	71	10	48.6	0.16	3.0
New York.					
Addison	87	17	50.0	1.07	0.2
Akron				1.04	
Albany					3.2
Alfred	84	12	48.2	1.69	6.9
Angelica†	85	9	48.2	1.58	5.5
Appleton	82	21	47.7	0.43	0.2
Arcade	80	13	47.8	1.36	2.5
Avon	85	19[e]	50.4[e]	1.05	
Baldwinsville	84	19	49.9	0.76	0.5
Bedford	92	14	50.5	0.91	4.8
Big Sandy *10	78	14	45.8		
Binghamton†	87	17	49.8	0.63	1.0
Bloomville	89	10	50.4	1.69	0.5
Bolivar	84	8	47.0	1.48	
Boyds Corners				1.13	
Brentwood	90	18	47.8	2.53	0.3
Brookfield	87	24	52.4	1.20	7.0
Brooklyn	90	24	53.0	0.87	3.0
Buffalo					0.2
Canton†	79	15	44.8	2.66	8.0
Carmel	88	20	50.7	1.20	4.0
Charlotte *10	77	22	45.9		
Cherry Creek				2.69	
Cooperstown†	81	15	46.3	1.25	6.0
Cortland	85	13	47.6	0.93	
De Kalb Junction				1.28	
Eagle Mills				1.60	
Elmira†	89	19	54.2	0.77	
Fleming	84	19	50.4	1.40	T.
Fort Niagara†	86	18	47.6	0.51	
Friendship	85	15	49.5	1.58	2.9
Glens Falls	86	20	47.2	1.20	T.
Gloversville	82	17	46.6	0.96	1.4
Hamilton	85	14	46.8	0.90	1.8
Haskinville				0.64	
Honeymead Brook	87	21	48.9	0.83	1.9
Humphrey†	85	14	49.0	1.31	7.0
Ithaca	86	21	50.4	1.02	T.
Jamestown	82	16	50.8	2.48	7.0
Kings Station				0.70	
Lebanon Springs	86	18	46.1	1.86	7.5
Lockport	85	15	51.2	0.40	T.
Lowville	78	13	44.4	0.80	3.0
Lyons	85	20	50.7	1.02	T.
Madison Barracks†	79	10	46.2	0.38	
Malone	79	12	43.0	2.17	11.5
Manhattan Beach†				1.93	9.5
Middletown	86	17	49.6	1.40	4.0
Mohonk Lake	84	17	46.8		6.0
Mount Morris	89	18	50.6	0.46	1.0
Newark Valley				0.39	
New Lisbon	84	15	46.0	0.80	1.5
New York					1.7
North Hammond†	78	16	47.1	1.33	6.0
Number Four†	79	11	42.5	1.84	11.2
Ogdensburg	75	11	45.2	0.72	2.2
Oneonta	86	16	49.9	1.39	
Oswego					5.0
Oxford	85	15	47.2	0.77	1.0
Palermo†	80	17	47.4	0.41	T.
Perry City	85	15	48.9	1.58	1.1
Phœnix				0.90	
Pine City				0.97	
Pittsford	84	20	50.2	0.89	
Plattsburg Barracks†	88	19	43.3	0.85	1.0
Port Jervis	92	20	51.3	1.63	0.5
Potsdam	78	13	44.4	1.37	5.0
Poughkeepsie	91	21	50.2	1.11	4.5
Ridgeway				0.57	
Rochester					1.0
Rome	80	18	48.5	1.35	
Romulus	87	18	51.3	2.90	1.0
Rose†				0.98	
Saranac Lake	78	10	40.2	1.37	7.5
Scottsville				0.90	
Setauket†	87	24	48.7	1.02	
Sherwood				0.63	
Skaneateles				0.97	
South Canisteo	86	12	48.0	1.25	2.5
Southeast Reservoir				1.48	
South Kortright†	86	11	45.8	1.48	
Turin	75	13	42.7	1.48	9.1
Varysburg	85	12	49.3	1.93	2.9
Victor	85[b]	18	45.2[b]	0.92	0.2
Wappingers Falls	90	21	52.8	1.18	5.0
Warwick				1.49	
Watertown	83	16	49.8	1.37	
Waverly†	90	15	51.0	1.18	3.0
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Wedgwood	87	13	49.3	2.52	1.5
Westfield	82	20	50.8	1.22	1.5
Westpoint†	93	21	50.3	1.98	
Willetspoint	91	24	48.8	1.13	4.5
North Carolina.					
Asheville†	90	30	60.3	2.50	
Beaufort†	83	38	62.4	1.87	
Bryson City†				2.95	
Chapelhill†	97	31	63.8	2.23	
Currituck Inlet†				1.60	
Edenton†	88	32	61.7	2.13	
Experimental Farm	92	31	64.8	1.73	
Fairbluff†				1.21	
Falkland *1	92	34	63.1	2.63	
Fayetteville†	91	36	65.0	1.15	
Flatrock	88	26	58.0	1.97	
Greensboro†	92	29	62.4	2.74	
Greenville				6.00	
Henderson†	96	30	62.9	1.83	T.
Highlands	81	21	55.0	0.92	
Highpoint *1	95	30	65.0	1.20	
Horse Cove†	87	30	59.8	1.86	
Jacksonville†	91	37	66.2	3.50	
Jefferson†	88	26	57.3	1.10	
Lenoir *†1	88	34	61.3	2.69	
Linville†	79	21	50.6	4.80	
Littleton†	97	29	61.4	1.20	
Louisburg†	96	28	63.2	1.46	T.
Lumberton†	92	34	66.1	0.89	
Lynn *†2	95		61.0	2.78	
Marion	94	30	64.3	2.62	
Mocksville†	97	31	65.2	1.27	
Moncure†	94	30	63.5	1.61	
Monroe	92	30	64.4	2.00	
Morganton *†1	91	35	64.1	1.58	
Mountairy†	94	26	60.6	0.94	
Mount Pleasant	94	32	64.0	1.19	
Murphy†				3.23	
Newbern†	92	34	65.3	2.37	
Oakridge†	96	32	64.3	1.88	
Pantego				3.77	
Pittsboro	93	30	63.2	1.42	T.
Raleigh *1	93[e]	29	64.4		
Rockingham†	97	35	67.0	2.31	
Roxboro†	96	27	62.4	2.79	
Salem†	98	30	63.6	2.11	
Salisbury†	94	31	63.8	1.09	
Saxon†	97	27	62.3	1.84	
Selma	94	31	64.4	2.58	
Settle	97[d]	28	65.8[e]	2.72	
Skyuka	84	30	58.4	2.90	
Sloan†	92	32	64.5	3.65	
Soapstone Mount†	95	25	60.6	1.45	
Southern Pines†	101	28[e]	65.9	0.50	
Southport†	87	35	62.7	0.90	
Springhope *1	91	31	61.2	1.50	
Tarboro	97	28	64.0		
Waynesville†	86	28	58.3	1.81	
Weldon†	94	29	62.2	1.94	
Wilkesboro† *d*	93	24	59.4		
Willeyton	97	28	61.2	1.27	
North Dakota.					
Amenia	77	12	41.8	6.41	3.0
Ashley†	83[e]	14[e]	42.0[e]	4.92	4.5
Bismarck					0.6
Buxton	71	8	39.3	5.85	
Churchs Ferry	79	11	37.3	5.98	
Coalharbor†	75	14	39.4	2.72	6.2
Dickinson†	81	2	40.6	2.35	10.2
Falconer	80	10	40.4	2.30	0.5
Fargo†	77	13	42.0	3.64	
Forman†				5.32	6.0
Fort Berthold†	80	10	43.2	4.04	9.0
Fort Yates†	85	10	44.0	3.51	
Gallatin†	80	10	38.6	6.25	5.0
Glenullin†	83	16	42.7	2.10	6.3
Grafton†	76	11	37.8	4.75	6.0
Grand Rapids	83	15	40.2	5.12	8.0
Jamestown†	78	18	41.4	6.20	2.8
Kelso† *g*	72	11	42.2	7.19	7.0
Larimore† *g*	76	11	41.4		
Lemert†				4.87	2.5
McKinney	75	12	38.5	2.03	12.2
Mayville	76	13	40.2	5.85	5.5
Medora†	92	13	41.9	0.99	1.5
Milton†	75	6	35.8	8.51	0.6
Minto†	79	10	37.9	5.23	
Napoleon†	81	18	40.6	2.65	3.0
New England City†	76	8	42.4	0.63	4.3
Oakdale†	77[b]	15[b]	44.8[b]	2.40	24.0
Portal†	82	13	38.3	2.40	20.0
Power†	75	12	41.5	4.19	4.5
St. John†	74	13	34.0	4.14	3.0
Sheyenne	83	12	39.4	8.61	0.5
Steele†	81	19	40.8	3.87	0.8
Towner†	79	15	37.3	3.84	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
University†	71	13	40.0	5.59	8.5
Wahpeton†	79	17	44.9	5.10	.....
Wildrice†[2]	.....	.....	40.6	3.79	5.5
Williston	.....	.....	.....	.....	26.6
Willow City†	81	11	38.2	3.60	4.0
Woodbridge†	76	3	35.0	7.78	.....
Ohio.					
Akron	86	19	55.1	5.06	1.7
Annapolis	92	18	54.8	2.55	.....
Ashland	87	19	54.6	3.84	0.5
Ashtabula	80	20	50.0	2.96	1.0
Athens	90	22	59.6	1.88	.....
Atwater	.....	.....	.....	5.88	0.5
Auburn	86	15	51.2	4.50	2.5
Bangorville	86	18	55.5	4.03	1.0
Basil	.....	.....	.....	2.47	.....
Bellefontaine	86	21	54.4	2.57	0.5
Benton Ridge	90	19	57.0	2.04	1.0
Berlin Heights	89	19	54.6	3.71	.....
Bethany	90	25	60.7	0.91	.....
Bigprairie	88	19	55.6	3.18	T.
Binola	89	21	57.6	4.90	1.5
Bissells	85	16	52.8	3.25	1.0
Bladensburg	88	20	55.1	2.76	T.
Bloomingburg	92	23	59.2	1.65	.....
Bowling Green	88	20	55.0	2.93	.....
Bucyrus†	90	20	56.7	4.03	0.3
Caledonia†	.....	.....	.....	5.08	0.8
Cambridge	89	20	54.9	2.87	.....
Camp Dennison	89	25	61.4	0.64	T.
Canal Dover	92	20	55.0	3.28	T.
Canfield	.....	.....	.....	2.63	2.1
Canton†	88	20	55.7	3.69	0.4
Cardington	88	20	54.8	2.44	1.0
Carrollton	89	17	52.6	4.13	T.
Cedarville	.....	.....	.....	1.88	.....
Celina	89	24	58.9	2.23	.....
Cherryfork	94	18	59.8	0.61	.....
Cincinnati	.....	.....	.....	.....	T.
Circleville[b]	91	26	60.2	1.61	T.
Clarksville	87	23	59.3	1.03	.....
Cleveland (V. O.)	86	22	53.5	4.45	1.7
Cleveland (W. B.)	.....	.....	.....	.....	2.1
Clifton	90	22	58.4	1.63	0.2
Coalton	93	17	58.2	1.56	.....
Colebrook	87	18	54.5	2.88	2.5
Columbus	.....	.....	.....	.....	T.
Dayton[a]	88	23	60.0	2.17	T.
Dayton[b]†	.....	.....	.....	1.54	T.
Defiance	91	20	55.4	4.03	T.
Delaware	.....	.....	.....	3.00	T.
Demos	89	20	56.4	2.78	T.
Dupont	87	22	56.0	4.63	T.
Elyria	88	22	55.3	4.67	0.9
Fairport Harbor*[10]	82	26	50.4	.....	.....
Fayetteville	89	25	59.8	1.01	.....
Findlay	91	21	57.6	1.92	T.
Frankfort	91	24	59.8	3.20	.....
Garrettsville†	86	19	51.6	4.93	3.5
Granville	90	22	57.8	2.75	0.2
Gratiot	90	22	57.4	2.80	0.4
Greenfield	86	26	59.2	1.20	.....
Greenhill	88	17	53.2	3.22	1.2
Greenville	84	24	57.1	1.65	T.
Hackney	88	22	57.0	2.80	1.0
Hanging Rock	93	21	60.0	0.81	.....
Hedges	89	20	55.6	2.91	1.0
Hillhouse	86	15	51.8	3.83	4.2
Hillsboro†	94	21	58.8	1.35	.....
Hiram	85	18	53.0	4.59	2.0
Hudson	88	17	54.6	3.70	.....
Jacksonboro	89	25	59.9	1.65	.....
Kenton†	91	21	57.4	3.04	.....
Killbuck	86	18	55.8	3.74	T.
Lancaster	88	24	57.2	2.71	.....
Leipsic	88	20	55.2	3.88	0.2
Levering	80	18	54.8	3.19	.....
Logan	95	19	58.9	3.53	0.2
Lordstown	87	20	54.1	3.74	1.0
McArthur	91	22	58.2	1.49	.....
McConnelsville†	93	22	58.1	3.12	T.
Mansfield†	.....	.....	.....	4.93	0.6
Marietta[a]†	.....	.....	.....	2.03	T.
Marietta[b]	92[9]	24[9]	60.0[9]	2.69	T.
Marion	89	20	57.3	4.81	1.1
Medina	86	20	54.4	4.00	1.0
Milfordton	88	18	55.7	2.16	1.0
Milligan	94	21	58.2	2.83	.....
Millport	86	22	56.9	3.12	T.
Montpelier	86	20	53.6	6.87	T.
Napoleon	88	20	53.4	2.56	T.
Neapolis	.....	.....	.....	3.69	.....
New Alexandria	88	20	56.4	4.66	2.0
New Berlin	87	18	55.0	5.47	T.
New Bremen	86	21	56.3	.....	.....
New Comerstown	90	22	55.6	2.98	.....
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
New Holland	90	24	58.8	1.82	0.2
New Moscow	.....	.....	.....	3.06	0.5
New Paris	86	24	58.9	1.34	.....
New Waterford	.....	.....	.....	4.52	0.2
North Lewisburg	90	21	57.0	2.40	T.
North Royalton	86	18	53.4	3.52	2.0
Norwalk	92	16	54.8	3.35	T.
Oberlin	93	23	57.6	2.72	T.
Ohio State University	89	23	57.6	2.59	.....
Orangeville	86	15	52.6	2.35	2.0
Ottawa	87	22	56.7	2.67	T.
Pataskala†	91	22	57.6	2.05	T.
Peoli	90	19	56.4	1.72	.....
Perry	.....	.....	.....	3.67	.....
Philo	92	22	59.3	4.65	.....
Plattsburg	87	18	57.8	1.47	T.
Pomeroy	92	21	59.8	0.46	T.
Portsmouth[a]†	.....	.....	.....	1.53	.....
Portsmouth[b]	96	29	63.1	1.56	.....
Richwood	.....	.....	.....	2.88	0.5
Ridgeville Corners	90	18	54.3	3.72	.....
Ripley	90	27	60.8	1.18	.....
Rittman	85	18	52.3	3.76	T.
Rockyridge	91	20	55.0	3.40	T.
Rosewood	86	23	56.0	2.47	.....
Sandusky	.....	.....	.....	.....	T.
Sharon Center	88	24	61.8	3.10	.....
Shenandoah	88	16	54.6	3.76	0.4
Sidney[b]	.....	.....	.....	2.95	.....
Sinking Spring†	89	23	60.6	1.01	T.
Springboro	.....	.....	.....	1.71	.....
Spring Valley	90	21	58.2	1.89	.....
Strongsville	.....	.....	.....	4.67	1.5
Sylvania	88	17	52.1	4.87	T.
Thurman	103	24	62.4	1.04	.....
Tiffin†	86	22	56.8	3.13	T.
Toledo	.....	.....	.....	.....	0.4
Upper Sandusky	89	22	57.0	3.19	.....
Urbana	85	24	57.0	1.87	T.
Vanceburg	91	22	60.6	0.25	.....
Van Wert	88	21	56.5	3.20	1.5
Vermilion	89	19	53.8	4.52	2.5
Vickery	92	21	55.4	3.61	0.2
Walnut	91	26	59.4	2.23	T.
Warren	88	19	53.6	3.06	5.7
Warsaw	91	18	55.1	3.60	0.5
Wauseon	89	19	54.2	6.65	0.6
Waverly	96	21	61.3	1.25	T.
Waynesville	.....	.....	.....	1.88	T.
Westerville	86	22	57.1	2.31	0.3
Willoughby	.....	.....	.....	2.21	.....
Wooster[a]	89	19	54.6	3.34	0.8
Wooster[b]†	.....	.....	.....	3.58	T.
Youngstown	88	20	53.0	3.32	0.5
Oklahoma.					
Alva†	95	22	63.0	2.80	.....
Anadarko†[h]	93	24	67.0	1.45	.....
Arapaho†	98	23	65.4	1.70	.....
Beaver†	97	33	66.2	1.22	.....
Burnett†	91	27	66.2	0.83	.....
Clifton†	94	23	66.8	0.69	.....
Enid†	93	23	65.6	0.87	.....
Fort Reno†	91	29	65.4	1.05	.....
Fort Sill	94	31	65.9	1.63	.....
Guthrie†	92	30	66.4	1.56	.....
Hennessey†	99	30	67.8	0.86	.....
Keokuk Falls†	93	34	68.4	0.95	.....
Mangum†	95	27	66.6	1.75	.....
Norman†	98	31	68.4	0.85	.....
Ponca†	92	28	67.6	1.29	.....
Pondcreek†	91[1]	30[1]	60.2[1]	1.25	.....
Prudence†	.....	.....	.....	1.58	.....
Sac and Fox Agency†	89	27	63.6	1.90	.....
Stillwater†	91	26	66.3	0.94	.....
Winnview†	.....	.....	.....	0.99	.....
Woodward†	87	30	59.0	3.67	.....
Oregon.					
Albany[a]†	69	31	48.1	5.55	.....
Arlington†	69	26	51.6	0.47	.....
Ashland[b]	64	27	45.2	2.53	1.3
Aurora*[8]	70	33	50.5	4.49	.....
Aurora (near)	69	26	46.6	4.60	1.5
Baker City	.....	.....	.....	.....	4.3
Bandon	58	32	47.8	9.14	.....
Beulah†	64	15	40.4	0.90	T.
Brownsville*[8]	68	28	44.7	4.98	.....
Burns†	59	14	37.4	1.30	4.0
Cascade Locks	72	30	48.2	9.44	.....
Comstock*[8]	64	34	44.7	7.77	.....
Corvallis[a]	66	29	46.2	6.98	.....
Corvallis (near)	67	30	46.8	6.79	.....
Crook	58	17	37.4	2.35	3.5
Dayville†	67	25	46.0	1.85	.....
Detroit†	62	26	39.8	7.85	.....
Eugene†[a]	65	30	47.1	5.89	T.
Eugene†[b]	.....	.....	.....	5.66	.....
Oregon—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fife†	53	15	35.8	2.02	12.0
Forest Grove	71	29	46.1	5.21	.....
Gardiner	61	32	47.0	14.70	.....
Glenora	69	24	45.0	13.60	1.2
Grants Pass[a]†	69	25	46.0	3.45	.....
Hood River (near)	70	26	46.0	3.17	.....
Hubbard	65	28	46.4	5.71	3.5
Jacksonville	66	28	44.7	2.25	0.2
Joseph†	62	17	37.6	1.27	7.0
Junction City*[8]	66	31	48.6	4.95	.....
Lafayette*[8]	68	38	50.4	3.88	.....
Lakeview†	56	15	36.2	3.94	22.0
Langlois	67	33	50.0	18.37	.....
Lone Rock	62	19	35.9	3.26	10.0
Lorella	58	26	39.4	8.52	28.0
McMinnville[a]†	67	29	46.2	4.55	0.2
Merlin*[8]	68	28	45.8	4.60	.....
Monmouth*[8]	65	36	53.1	5.00	.....
Mount Angel†	69	29	47.0	6.01	1.0
Nehalem	.....	.....	.....	15.23	0.5
Newberg	70	28	46.8	5.34	2.0
Newbridge	70	23	46.2	0.52	.....
Newport	65	29	46.0	12.95	.....
Pendleton	72	23	47.9	1.99	.....
Riddles*[8]	68	30	44.6	3.13	0.5
Roseburg	.....	.....	.....	.....	T.
Salem[b]†	65	29	47.6	6.12	.....
Salmon	61	7	34.3	13.29	75.0
Sheridan*[8]	68	37	49.5	4.82	.....
Silver Lake	58	10	36.2	1.89	18.5
Silverton*[8]	62	36	46.6	5.88	0.5
Siskiyou*[8]	62	26	40.0	7.20	54.0
Sparta	58	19	39.6	1.93	9.0
Springfield*[8]	62	24	43.8	6.34	.....
Stafford*	69	30	46.3	5.77	3.2
The Dalles†	72	28	49.8	0.95	.....
Tillamook Rock L. H†	.....	.....	.....	7.12	.....
Umatilla†	.....	.....	.....	1.04	.....
Vale	70	15	46.6	1.16	T.
West Fork*[8]	68	30	45.8	6.58	2.8
Weston	69	30	48.0	4.81	T.
Williams	64	26	45.4	3.50	.....
Pennsylvania.					
Altoona	.....	.....	.....	1.38	T.
Aqueduct	95	28	55.8	1.28	0.2
Beaver Dam†	.....	.....	.....	2.70	T.
Bethlehem	.....	.....	.....	1.27	.....
Blooming Grove	87	7	45.0	0.99	5.2
Brookville†	.....	.....	.....	2.28	.....
Browers Lock	.....	.....	.....	1.40	.....
Cameron	.....	.....	.....	1.70	.....
Carlisle	97	25	54.6	2.36	.....
Cassandra	85	20	52.4	2.89	14.0
Cedarrun	.....	.....	.....	1.30	T.
Centerhall†	90	13	53.4	1.41	T.
Chambersburg†	93	23	53.6	0.97	.....
Coatesville	95	22	53.9	1.38	.....
Confluence†	.....	.....	.....	2.80	3.0
Coopersburg	91	23	53.8	1.35	0.4
Davis Island Dam†	.....	.....	.....	2.80	.....
Doylestown	.....	.....	.....	1.65	.....
Driftwood	.....	.....	.....	1.84	.....
Dubois†	.....	.....	.....	2.58	2.8
Duncannon	.....	.....	.....	1.59	.....
Dyberry†	88	16	47.8	0.67	2.5
East Bloomsburg	.....	.....	.....	1.03	.....
East Mauch Chunk	92	22	52.9	1.32	1.0
Easton	89	23	53.6	1.23	T.
Edinboro*[1]	80	15	50.7	.....	1.0
Ellwood Junction†	.....	.....	.....	2.65	1.0
Emporium	89	21	51.2	1.88	T.
Erie	.....	.....	.....	.....	0.8
Farrandsville	.....	.....	.....	1.12	.....
Forks of Neshaminy*[1]	87	32	56.1	1.81	.....
Frederick	.....	.....	.....	1.88	.....
Freeport†	.....	.....	.....	2.24	.....
Girardville	.....	.....	.....	1.88	2.0
Grampian	86	18	52.6	2.40	2.0
Greensboro†	.....	.....	.....	2.69	T.
Hamburg	94	23	54.4	2.05	T.
Harrisburg	.....	.....	.....	.....	T.
Hollidaysburg	93	21	55.0	2.07	.....
Honesdale	95	16	52.0	0.20	T.
Huntingdon[a]†	93	30	54.2	2.02	.....
Huntingdon[b]	.....	.....	.....	1.85	.....
Johnstown†	91	21	54.6	2.57	1.0
Karthaus	.....	.....	.....	0.80	.....
Keating	.....	.....	.....	1.40	T.
Kennett Square	93	27	53.6	2.05	0.2
Lancaster	92	24	53.3	1.94	.....
Lansdale	.....	.....	.....	1.42	.....
Lebanon	95	24	53.7	1.29	T.
Leroy†	87	13	49.8	1.44	3.7
Lewisburg	92	23	53.4	1.11	T.
Lock Haven[a]†	94	21	55.4	1.21	.....
Lock Haven[b]	.....	.....	.....	1.02	.....

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lock No. 4†				2.78	T.
Lycippus	88	21	55.6	2.33	
Mifflin				1.69	
Nisbet				0.90	
Oil City†				2.96	2.5
Ottsville				1.41	
Parker†				2.04	1.0
Philadelphia *c*	93	28	55.8	1.21	T.
Philadelphia W. B.					T.
Pittsburg					0.4
Point Pleasant				1.39	
Pottstown	94	27	55.4	1.83	
Quakertown	92	22	52.2	1.61	T.
Reading[2]			52.9	1.10	
Renovo				1.25	
Ridgway†				2.56	1.5
Saegerstown	85	4	50.6	2.95	2.3
Salem Corners	86	16	50.4	1.18	3.2
Scranton	91	19	51.8	0.97	T.
Seisholtzville				1.81	
Selinsgrove	94	22	53.0	1.16	1.0
Shawmont				0.96	
Shinglehouse	84	12	48.3	1.34	2.0
Sinnamahoning				0.90	
Smethport	87	12	48.8	1.88	T.
Smiths Corners				1.49	
Somerset	87	15	51.4	3.27	4.1
South Bethlehem *[1]	91	28	57.8		
South Eaton	89	20	50.6	1.13	2.0
Spruce Creek				1.82	T.
State College	88	21	52.0	1.47	T.
Sunbury				0.57	
Swarthmore	92	28	55.7	1.93	
Towanda	87	19	51.0	0.93	1.0
Uniontown	89	25	55.9	2.62	2.5
Warren†				2.69	5.0
Waterville				1.05	
Wellsboro *†	86	14	46.2	0.91	0.5
West Chester	92	20	54.9	1.49	
West Newton†				2.68	1.0
White Haven *[1]	90	20	51.8	1.00	3.0
Wilkesbarre†	94	21	54.6	1.06	2.0
Williamsport	89	22	52.6	1.03	T.
York†	94	26	54.8	1.45	T.
Rhode Island.					
Block Island					0.1
Bristol	80	25	46.7	1.27	0.2
Kingston	85	22	46.4	1.48	T.
Lonsdale				0.99	
Narragansett Pier					T.
Pawtucket	85	27	50.3	1.17	0.5
Providence *a*	88	24	49.2	1.22	1.0
Providence *c*	88	23	48.3	1.30	T.
South Carolina.					
Allendale†	92	36	67.0	1.40	
Anderson†				1.02	
Batesburg†				1.50	
Blackville†	95	36	68.2	2.09	
Camden†				0.72	
Central†	96	33	64.0	1.37	
Cheraw *a*†	94	32	65.8	1.25	
Cheraw *b*†				1.31	
Conway†				1.98	
Darlington (near)				2.18	
Edisto†				0.91	
Effingham†				1.34	
Florence†	94	39	67.2	1.09	
Georgetown†	92	39	66.1	0.69	
Gillisonville†	98	34	69.0	0.72	
Greenville†	88	32	63.9	1.37	
Greenwood†	96	38	67.6	2.26	
Holland†	96	33	65.8	2.16	
Kingstree *a*†	95	34	68.0	1.41	
Kingstree *b*†				1.46	
Little Mountain	97	35	66.7	1.64	
Longshore†	92	35	66.4	1.04	
Mount Carmel†				2.46	
Pinopolis *[1]	87	42	65.2	1.12	
Port Royal†	89	45	68.2	0.40	
St. George†	92	38	67.2	1.41	
St. Matthews†	93	38	66.3	1.16	
St. Stephens†				0.51	
Santuck†	92	30	65.2	0.97	
Shaws Fork *[1]	95	43	70.2	1.52	
Smiths Mills†				2.25	
Society Hill†	91	36	66.6	0.95	
Spartanburg†	95	31	66.2	1.01	
Statesburg†	91	38	67.3	1.09	
Trenton	91	40	69.1	1.99	
Trial†	92	34	66.5	1.00	
Winnsboro	94	32	67.2	0.91	
Yemassee†	93	37	68.4	0.19	
Yorkville	91	37	66.2	2.22	
South Dakota.					
Aberdeen†	81	16	48.2	6.50	
Alexandria†	87	10	47.5	5.66	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Armour†	89	20	49.7	7.49	
Ashcroft†	83	9	44.0	1.47	5.0
Brookings†	80	10	45.5	6.26	
Canton *[1]	85	15	48.7	5.78	6.0
Castlewood†	84	8	44.8	7.84	
Clark†	86	4	44.7	7.81	
Cross†	78	5	41.5	1.39	8.8
Farmingdale				1.50	3.5
Faulkton†	93	16	44.2	5.66	2.0
Flandreau†	85	10	48.4	6.03	2.9
Forestburg†	85	14	48.6	5.23	
Forest City†	88	20	48.6	3.00	6.0
Fort Meade†	84	16	46.3	2.51	6.9
Gary†	81	9	45.0	6.87	
Goudyville *†	82	18	42.8	4.57	
Greenwood†	74[1]	20[1]	45.2[1]	6.61	
Highmore†	89	17	45.6	2.50	3.5
Hitchcock				5.82	
Hotch City†	87	11	47.6	3.81	1.0
Huron					T.
Kimball†	86	17	48.2	5.40	
Leslie†	91	11	48.6	2.15	T.
Millbank†	80	12	44.1	5.95	
Mitchell†	86	14	48.6	5.70	
Northville *[1]	80	20	43.9	5.30	
Nowlin†	93	13	46.6	1.71	7.0
Oelrichs†	86	7	48.7	3.00	
Parker†	85	15	50.5	4.58	
Parkston†	88	17	48.7	4.92	
Pierre					2.5
Plankinton†	90	18	48.9	5.42	
Rapid City					6.3
Rosebud†	86	18	47.4	3.04	3.0
Shiloh†	80	15	46.6	4.14	
Sioux Falls†	83	14	48.2	5.96	
Tyndall†	89	15	53.4	4.65	
Vermillion	84	28	53.2		
Watertown†	82	12	46.0	8.04	
Webster†	82	12	42.0	8.30	1.0
Wentworth†	83	4	47.2	5.16	
Wessington Springs†	86	17	48.3	4.70	
Yankton†	86	18	51.0	5.24	
Tennessee.					
Andersonville *[1]	96	34	63.7	2.50	
Ashwood *†	88	34	64.8	4.97	
Benton (near) †	89[x]	42[x]	67.8[x]	2.43	
Bolivar†	89	32	66.7	4.22	
Bristol†	88	37	59.4	1.94	
Brownsville†	88	34	70.0	2.04	
Carthage†				3.60	
Charlotte *†	89	30	65.4	4.61	
Clarksville†	88	34	64.8	3.27	
Clinton†				2.88	
Cookeville†	96	25	66.6		
Decatur†	89[c]	31[c]	63.0[c]	5.50	
Dyersburg†	86	38	67.4	4.03	
Elizabethton†	93	28	62.0	3.09	
Fairmount *[1]	83[d]	34	61.1[c]	4.58	
Florence†	85	34	64.2	5.28	
Franklin†	88	29	63.8	4.75	
Greeneville†	88	25	61.6	4.32	
Harriman†	92	29	64.0	3.47	
Hohenwald *†	90	33	60.0	3.83	
Jackson†	86	33	67.2	5.41	
Johnsonville†	91	28	66.3	3.02	
Jonesboro *†	88	29	61.7	2.23	
Liberty†	88	32	64.7	2.60	
Loudon†				3.80	
Lynnville *[1]	89	30	63.7	3.63	
McKenzie *†	86	35	67.4	1.70	
McMinnville†	89	32	63.0	4.67	
Milan†	87	30	67.2	3.67	
Molino†	88	30	64.3	5.24	
Newport *[3]	93	30	62.0	5.08	
Nunnelly *[1]	87	35	66.3	5.78	
Palmetto†	87	32	65.5	3.89	
Riddleton†	90	33	67.0	3.13	
Rockwood†				2.42	
Rogersville†	90	31	62.0	3.11	
Rugby *[1]	86	27	62.7	2.35	
St. Joseph†	88	29	65.6	6.11	
Savannah†	89	39	70.2	2.69	
Sewanee†	83	31	63.0	5.55	
Springdale *[1]	96	28	65.9	3.43	
Tellico Plains†				4.68	
Trenton	87	34	66.4	2.66	
Tullahoma†	87	30	62.8	6.50	
Union City†	86[d]	31[d]	65.4[d]	2.76	
Waynesboro *[1]	86	29	63.0	3.00	
Texas.					
Albany *†	86	28	63.1	1.10	
Arthur City†				1.12	
Aurora *[1]	99	34	69.8	0.90	
Austin *a*†	92	45	69.8	6.50	
Austin *b* *[5]	88	38	65.4		
Ballinger†	96	28	67.4	1.22	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Beeville†	96	50	73.0	2.47	
Boerne *†	88	40	67.2	2.95	
Brady†	96	29	66.8	1.54	
Brazoria†	89	51	70.4	2.73	
Brenham†	88	43	70.4	3.67	
Brownwood *†	95	28	66.2	1.24	
Burnet *†	90	34	68.0	2.67	
Camp Eagle Pass†	102	47	75.1	0.40	
Chillicothe	97	31	65.6	1.50	
Coleman *[3]		36	65.0	1.56	
College Station	85	46	68.5	1.46	
Colmesneil				4.24	
Columbia†	90	50	70.6	2.26	
Corsicana *a*†	92[f]	32[b]	69.0[e]	1.77	
Corsicana *b*†		33		1.07	
Cuero†	91	49	72.0	3.90	
Dallas†	93	32	68.2	1.23	
Danevang†	91	50	70.9	2.98	
Dublin†	93	34	67.7	2.33	
Durham†				2.17	
Duval *[1]	92	42	70.8	4.67	
Estelle†	89	31	68.1	1.33	
Flower Bluff†	93	54	72.7	0.59	
Forestburg†	94	32	66.8	1.14	
Fort Brown†	95	45	74.2	1.30	
Fort Clark		44		0.60	
Fort McIntosh	98	43	75.9	1.06	
Fort Ringgold†	104	43	77.6	1.65	
Fort Stockton†				T.	
Fredericksburg *†	91[c]	38	66.7[c]	5.07	
Gainesville†	92	31	67.2	1.62	
Georgetown *[1]	90	39	66.8	4.11	
Golindo				2.10	
Grapevine†	94	33	66.8	1.28	
Hale Center†	90	27	63.1	1.55	
Hallettsville†	90	49	71.5	2.03	
Happy†	87	15	59.3	2.46	
Hartley†	88	12	60.4	0.95	T.
Haskell†	98	30	70.1	0.81	
Hewitt				1.87	
Houston†	89	48	70.3	3.02	
Huntsville†	86	42	69.5	2.00	
Kerrville†	84[b]	33[f]	61.2[f]	6.14	
Lampasas†	91	28	66.2	2.72	
Leakey†	93	40	68.8	1.72	
Llano *†	97	36	69.7	2.60	
Longview†	91	36	70.0	2.09	
Luling†	89	44	70.5	1.86	
Menardville *†	101[c]	32[c]	68.2[c]	1.60	
Midland†	100	31	68.8	0.00	
Mount Blanco *†	90	21	63.5	1.13	
New Braunfels†	86	45	68.9	3.34	
Orange†	85	43	70.0	2.00	
Panter†				1.61	
Paris†	90	32	68.0	1.95	
Point Isabel *[1]	86	58	75.7	0.35	
Rheinland†	99	29	67.3	0.62	
Roby†	97	38	66.8	0.85	
Rockport *[1]	86	52	71.8		
Rocksprings†				1.78	
Runge†	92	49	71.8	2.34	
San Antonio	90	44	71.0	2.80	
San Marcos *a*†				3.00	
Sierra Blanca†	89	23	64.3	0.00	
Stafford†	93	44	70.5	3.15	
Sulphur Springs†	90	31	66.9	0.24	
Temple†	90	38	67.9	2.81	
Tyler†	88	34	67.9	1.20	
Victoria				1.45	
Waco†	90	36	69.3	1.77	
Weatherford†	96	34	67.6	1.34	
Utah.					
Alpine City†				1.32	
Blue Creek *[3]	58	20	39.5	4.00	4.0
Brigham City†				1.53	
Castlegate†	82	10	45.7	T.	T.
Cisco†	87	17	51.6	T.	
Corinne *[3]	75	30	54.0	0.81	4.0
Deseret†	77[c]	7[c]	46.9[c]	0.47[b]	
Fillmore†	76	17	47.6	1.47	
Fort Duchesne†	76	4	43.7	0.21	0.8
Giles†	80	8	49.6	T.	
Grover†	69	−1	41.1	0.80	8.0
Heber†	70	10	40.8	2.40	6.0
Huntsville†				2.78	
Kelton *[3]	70	26	49.1		
Koosharem	70	−1	38.4	0.88	1.2
Levan†	73	12	43.8	1.23	5.5
Loa†	67	1	38.6	0.10	1.0
Logan†	70	13	43.6	2.11	
Mammoth	65	13	42.0	0.75	6.8
Manti†	82	8	46.8	0.95	9.5
Millville†				2.06	
Moab†	86	16	56.8	0.11	T.
Mount Pleasant *†	72	12	43.9	1.36	13.0
Ogden *a* *[3]	75	26	48.8	1.25	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Pahreah†	77	17	50.3	0.50	T.
Park City†	50	9	32.0	3.83	36.3
Parowan†	71	13	44.5	0.83	8.2
Promontory*[8]	72	28	47.2	0.10	1.0
St. George†	82	18	52.4	0.03	
Salt Lake City					0.6
Scipio†	74	11	39.9	1.06	T.
Snowville†	71	12	42.1	1.07	
Soldier Summit†	70	3	35.6	1.02	10.2
Terrace*[8]	67	16	44.9	0.63	0.3
Thistle†	75	12	46.0	1.00	9.0
Tooele†	72	18	44.8		
Vernal	72	16	45.8	0.89	2.2
Vermont.					
Brattleboro	88	21	48.6	1.53	0.5
Burlington†	82	20	47.1	0.60	5.0
Chelsea†	74	12	42.0	0.28	5.0
Cornwall	84	18	47.2	0.43	
Enosburg Falls†	82	12	44.6	1.75	11.0
Hartland†	83	16	44.8	2.04	4.0
Jacksonville	85	10	42.9	1.96	8.0
Northfield					2.2
Norwich	83	14	43.5	0.89	5.0
St. Johnsbury	76	17	43.4	1.14	5.0
Strafford*†[1]	73	18	44.3	0.61	8.0
Vernon*[8]	85	24	48.8	1.19	
Wells	78	12	43.7	1.23	3.5
Woodstock	83	15	44.2	1.38	4.0
Virginia.					
Alexandria	94	28	57.2	0.41	T.
Alleghaney*[1]	85	29	58.6		0.4
Ashland†	96	24	57.3	2.00	
Avon†	96	30	61.1	1.39	
Bedford City†	90	29	59.6	1.89	T.
Bigstone Gap†	90	23	57.2	2.46	
Birdsnest*†[1]	89	32	57.8	1.10	
Blacksburg	87	23	56.2	3.71	
Buckingham†	99	14	56.2	2.02	T.
Burkes Garden	82	18	54.2	3.18	
Callaville†	94	25	60.8	1.42	
Charlottesville	95	28	60.0	1.39	
Christiansburg†				2.80	
Clarksville†				5.40	
Dale Enterprise†	90	21	55.1	1.19	T.
Danville†				1.38	T.
Fredericksburg†	92	27	58.4	1.90	
Grahams Forge†	87	25	58.4	2.46	T.
Hampton	87	33	58.7	1.37	
Hot Springs	87	18	57.2	0.94	T.
Lexington†	92	24	59.2	1.11	T.
Lynchburg					1.5
Maidens	96	38	64.8		
Manassast	95	26	57.6	1.29	
Marion†	85[f]	28[f]	57.4[f]	1.50	
Monterey†	84	16	54.2	1.43	T.
Nottoway	100	24	59.4	2.12	0.5
Petersburg†	96	28	58.5	1.91	
Radford†				1.88	
Richmond (near)†	100	27	61.6	2.22	
Rockymount†	93	30	62.2	2.55	T.
Rural Retreat	87	22	55.5	1.72	
Salem†	90	30	60.5	2.46	
Saltville	87	26	58.8	2.05	
Smithville†	93	28	59.9	1.43	T.
Spottsville†	96	25	59.6	1.54	
Stanardsville†	94	28	57.9	1.83	0.5
Staunton†	93	21	58.0	1.33	T.
Stephens City†	96	25	57.2	1.35	T.
Sunbeam†	93	29	60.9	1.88	
Warsaw†	96	26	59.2	0.97	
Westbrook Farm	94	28	59.4		
Wytheville†	87	25	58.0	1.80	T.
Washington.					
Aberdeen†	65	29	46.6	8.98	
Anacortes				4.52	
Ashford†				7.66	2.5
Blaine†	69	22	44.2	3.65	T.
Cascade Tunnel†	61	12	37.5	9.30	47.0
Centerville†	66	27	45.6	1.25	T.
Chehalis†	75	25	46.6	5.47	
Colfax†	69	23	44.8	1.69	T.
Connell†	80	18	47.6		
Coupeville†	60	30	45.7	2.54	
East Clallam					T.
Eastsound†	60	32	46.6	1.56	
Ellensburg†	72	14	44.8	0.94	0.5
Ellensburg (near)	72	18	44.9	1.00	T.
Fort Simcoe†	77	26[j]	47.5[e]	0.80	
Fort Spokane	69	19	45.2	2.65	
Grandmound†	68	20	45.6	4.36	
Hunters†	61	15	38.1	2.11	1.5
Kennewick†	76	24	52.0	0.49	
Lakeside†	70	28	47.8	1.33	
Lapush†	71	30	45.6	5.65	T.
Madrone*†[1]	66	28	46.3	3.98	
Mayfield†		26		6.41	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Montecristo†	52	17	35.5	6.43	49.5
Moxee Valley†	73	18	48.6	0.29	
New Whatcom†	70	27	47.2	2.95	
Olga†	66	32	44.6	2.17	T.
Olympia†	70	28	46.3	4.06	
Pine Hill†	71	24	46.0	2.09	T.
Pomeroy†	72	27	48.2	1.14	0.2
Pullman†	62	22	43.0	1.89	
Queets†	65	30[c]	46.3[d]	9.91	
Rosalia†	66	25	42.8	1.78	T.
Shoalwater Bay*[10]	60	35	45.7		
Silvercreek*[1]	65	28	42.7	6.76	0.5
Snohomish†	70	27	47.0	5.03	
Southbend†	73	25	45.7	9.67	
Spokane					0.9
Stillaguamish†	67	23	44.5	5.22	
Sunnyside†	74	19	48.8	0.57	
Tacoma†	66	28	45.2	5.17	
Union City†	74	30	45.6	6.95	
Vashon†	65	32	46.4	5.27	
Walla Walla					T.
Waterville†	65	17	41.4	2.61	0.6
Wenatchee Lake†	65	19	40.2	1.40	
West Ferndale†	67	30	47.2	3.64	T.
West Virginia.					
Beckley	84	30	50.6	0.82	
Beverly†	92	20	57.6	3.17	2.0
Bloomery†	87	21	51.2	1.27	T.
Bluefield†	89	20	58.9	2.15	
Buckhannon *a*†				3.48	0.5
Buckhannon *b*†	88	21	56.6		
Burlington†	92	21	55.2	2.05	1.0
Charleston†				3.35	T.
Dayton				3.18	
Elkhorn†	87	25	59.2	2.76	
Ella†	89[i]	19[i]	57.3[d]	2.24	
Fairmont†				1.57	T.
Glenville†	88	22	58.2	1.40	0.5
Grafton†	92	21	59.2	2.18	0.5
Green Sulphur	90	23	57.0	0.84	
Harpers Ferry†				1.64	
Hewett†	94	25	61.8	1.31	
Hinton *a*†				2.64	
Hinton *b*†	91	24	59.6		
Leachtown†				1.11	
Marlinton†	88	16	53.0	1.82	1.5
Martinsburg†	93	26	56.2	1.30	T.
Morgantown *a*†				1.39	T.
Morgantown *b*†	90	20	56.6	1.68	0.2
New Martinsville†	93	24	59.2	2.07	
Nuttallburg†	90	15	56.4	2.60	
Oldfields†[c]	93	19	58.3	1.26	
Parkersburg					0.1
Pennsboro	92	20	58.7	1.91	
Point Pleasant†	95	26	61.4	1.84	
Powellton†	93	23	60.0	2.70	T.
Rowlesburg†				1.00	1.0
Sandyville†	92	21	59.2	1.42	T.
Spencer†	94	20	64.0	2.80	1.0
Weston *a*†				1.95	1.0
Weston *b**[1]	88	22	59.5		1.0
Wheeling *a*†				3.16	1.0
Wheeling *b*†	92	26	60.4	4.35	
White Sulphur Springs†	93	12	56.8	2.76	T.
Wisconsin.					
Amherst	82	9	46.6	4.70	
Antigo†	86	5	45.6	4.69	6.3
Apollonia*†[1]	76	2	46.4	5.38	12.0
Bayfield†	65	10	43.0	4.30	24.0
Beloit	83	18	54.6	2.25	
Black River Falls†				3.84	2.3
Boscobel†	84	11	52.8	4.99	4.0
Butternut†	81	— 7	42.4	3.18	2.0
Centralia	83	9	48.0	4.21	3.0
Chilton	85	10	49.8	3.97	0.2
Citypoint	93	9	51.2	5.22	
Crandon†	77	— 5	43.2	1.18	4.0
Delavan†	83	15	52.2	3.75	T.
Depere†	85	13	48.1	5.06	1.5
Eau Claire	83	10	47.0	6.35	2.5
Florence†	81	5	41.6	3.81	3.0
Fond du Lac†	85	11	48.7	3.68	
Grand River Lock				5.48	2.0
Grantsburg†	78	— 5	38.6	7.10	12.0
Greenbay					3.3
Hartford				4.71	T.
Harvey†	85	14	52.1	3.87	T.
Hayward†	77	— 2	44.0	7.06	11.5
Hillsboro	84	13	49.4	5.40	3.0
Koepenick*†[1]	80	6	48.9	4.30	5.0
La Crosse					2.6
Lancaster†	84	16	51.5	5.30	0.2
Lincoln†[2]			48.0	6.03	1.0
Madison†	81	14	51.8	4.91	0.5
Manitowoc†	70	12	44.8	7.51	0.8
Meadow Valley†	82	10	49.1	5.37	3.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wisconsin—Cont'd	°	°	°	*Ins.*	*Ins.*
Medford†	81	2	44.8	2.61	2.0
Menasha				5.30	2.0
Milwaukee					T.
Neillsville†	80	10	47.4	5.16	
New London	85	9	47.9	5.35	3.0
Oconomowoc†	83	12	52.2	5.29	T.
Oconto	79	12	46.4	7.19	2.5
Osceola†	80	— 4	44.9	5.67	7.0
Oshkosh†	86	11	48.8	3.72	4.8
Pepin	82	12	48.3	5.43	6.0
Pine River†				4.56	3.0
Portage†	85	12	51.2	3.84	1.0
Port Washington	88	12	46.2	4.56	
Prairie du Chien	87	13	51.4	5.59	1.2
Sharon†	85	10	51.7	3.64	
Shawano	84	8	46.1	6.35	3.0
Spooner†	78	— 7	42.8	4.31	15.0
Stevens Point†	82	9	48.8	3.67	6.0
Valley Junction†	84	11	49.2	5.23	3.5
Viroqua	81	13	50.2	8.19	4.0
Watertown†	82	11	50.9	4.59	T.
Waukesha†	85	12	49.8	4.11	T.
Waupaca†[3]	80[g]	10	45.6	4.74	5.0
Wausau†	82	8	46.8	3.30	4.5
Westbend	84	10	49.7	6.05	0.5
Westfield†	85	11	49.4	5.03	4.5
Whitehall†	83	12	48.4	4.25	2.0
Wyoming.					
Bighorn Ranch†	64	— 2	34.8	1.76	18.0
Cheyenne					8.4
Embar†	52	1	31.8	1.10	11.0
Fort Laramie†	84	13	46.4	0.97	9.0
Fort Washakie	70	0	39.1	1.60	13.6
Fort Yellowstone†	60	0	34.2	1.29	10.1
Lander (W. B.)					9.4
Laramie	67	2	37.4	3.53	
Lusk†	80	4	42.4	1.19	
Sheridan	75	10	41.8	1.05	6.0
Sundance	78	8	40.0	2.71	22.0
Wheatland†	79	7	45.2	0.55	5.5
Mexico.					
Ciudad P. Diaz	97	50	76.6	0.63	
Leon de Aldamas	94	40	71.4	0.30	
Mexico	87	44	66.2	0.72	
Puebla	87	48	67.1	1.11	
Topolobampo*[1]	90	56	72.3	T.	
New Brunswick.					
St. John	65	21	39.0	1.47	2.5
West Indies.					
Grand Turk Island				3.40	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

† Weather Bureau instruments.

‡ Record furnished by the Arrowhead Reservoir Company, in the San Bernardino Mountains, San Bernardino County, Cal., at elevations varying from 4,900 to 6,900 feet.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. ÷ 3.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "[a]" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

TABLE III.—*Data from Canadian stations for the month of April, 1896.*

Stations.	Pressure.			Temperature.		Precipitation.		Prevailing direction of wind.	Total depth of snow.
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.		
	Inches	*Inches.*	*Inches.*	°	°	*Inches*	*Inches.*		
St. Johns, N. F	29.75	29.90	+ .02	32.0	— 4.2	4.02	.....	ne.	19.2
Sydney, C. B. I	29.96	30.02	+ .15	34.6	+ 0.1	1.93	— 1.87	ne.	11.5
Grindstone, G. St. L.	29.95	29.98	.....	31.5	.....	1.10	.....	n.	10.4
Sandy Point	.....	.....	.....	.....	.....	.....	.....	.....	.....
Halifax, N. S	29.94	30.03	+ .15	38.8	+ 1.3	1.41	— 1.90	nw.	3.1
Grand Manan, N. B.	30.02	30.07	.....	38.6	.....	1.28	— 2.12	nw.	1.2
Yarmouth, N. S.	29.98	30.06	+ .15	38.6	— 0.4	1.41	— 1.53	nw.	4.0
St. Andrews, N. B.	.....	.....	.....	39.6	.....	1.28	— 1.28	ne.	4.0
Charlottet'n, P. E. I.	30.00	30.04	.....	34.8	.....	0.82	— 2.10	ne.	1.6
Chatham, N. B	30.05	30.07	+ .15	36.0	+ 2.5	1.75	— 1.35	e.	12.8
Father Point, Que.	30.06	30.09	+ .18	34.2	+ 1.7	1.25	— 0.77	e.	7.7
Quebec, Que	29.75	30.09	+ .14	36.3	+ 1.8	2.06	— 0.83	ne.	9.6
Montreal, Que	29.87	30.08	+ .12	41.4	+ 2.9	1.18	— 1.26	sw.	3.3
Rockliffe, Ont	29.54	30.06	+ .10	39.6	+ 5.6	2.05	+ 0.81	se.	16.6
Kingston, Ont	29.78	30.08	+ .11	41.8	+ 3.3	0.69	— 1.26	sw.	....
Toronto, Ont	29.70	30.09	+ .10	45.0	+ 5.0	0.76	— 1.12	ne.	0.3
White River, Ont	28.66	30.04	.....	33.6	+ 2.5	2.45	+ 1.53	s.	9.6
Port Stanley, Ont	29.44	30.09	+ .08	44.1	.....	2.93	+ 0.08	e.	5.2

TABLE III.—*Data from Canadian stations*—Continued.

Stations.	Pressure.			Temperature.		Precipitation.		Prevailing direction of wind.	Total depth of snow.
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.		
	Inches.	*Inches.*	*Inches.*	°	°	*Inches*	*Inches.*		
Saugeen, Ont	29.35	30.08	+ .08	45.0	+ 8.0	1.27	— 0.56	e.	1.9
Parry Sound, Ont.	29.36	30.07	+ .09	42.7	+ 8.2	1.48	— 0.24	w.	4.0
Port Arthur, Ont	29.28	30.00	— .02	34.7	+ 2.2	3.00	+ 1.63	ne.	6.8
Winnipeg, Man	29.12	29.97	— .06	34.8	+ 1.3	5.64	+ 4.29	n.	2.0
Minnedosa, Man	28.09	29.94	— .04	32.4	— 1.1	2.77	+ 1.65	nw.	10.2
Qu'Appelle, Assin.	27.62	29.93	— .03	33.1	— 2.4	2.59	+ 1.53	s.	22.6
Medicine Hat, Assin	27.54	29.87	— .05	39.0	— 5.0	2.26	+ 1.75	s.	11.9
Swift Curr't, Assin.	27.32	29.94	— .06	37.2	— 1.3	0.93	— 0.25	w.	9.2
Calgary, Alberta	26.24	29.85	— .07	34.2	— 3.8	0.64	+ 0.02	w.	2.8
Prince Albert, Sask.	28.40	29.95	.....	32.6	.....	3.37	.....	e.	5.9
Edmonton, Alberta.	27.53	29.92	+ .01	33.6	— 6.6	1.16	+ 0.59	nw.	9.4
Battleford, Sask	28.14	29.91	.....	34.0	.....	1.44	.....	se.	11.6
Spences Br'ge, B. C.	29.02	29.84	.....	47.6	.....	0.78	.....	sw.	0.0
Hamilton, Bermuda	30.00	30.16	+ .11	63.4	.....	1.70	.....	nw.	
Banff, Alberta	.....	.....	.....	32.2	.....	0.79	.....	sw.	...
Esquimalt, B. C.	29.87	29.90	... .	44.2	.....	1.08	.....	sw.	0.0
Ottawa, Ont	29.76	30.13	.....	41.5	.....	0.84	.....	e.	...
Sable Island	29.98	30.01	... .	36.0	....	1.38	.....	ne.	5.5

TABLE V.—*Mean temperature for each hour of seventy-fifth meridian time, April, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N Dak	36.9	36.2	35.7	35.4	35.0	34.5	34.0	34.7	36.2	38.5	40.7	43.4	45.1	46.1	47.6	49.0	49.5	49.7	49.0	47.3	44.1	41.4	39.9	38.7	41.2
Boston, Mass	43.7	43.3	42.9	42.2	41.8	41.4	42.8	44.5	46.9	48.0	48.9	49.4	49.9	50.9	51.0	50.9	50.1	49.7	48.6	47.9	47.0	45.9	45.0	44.4	46.5
Buffalo N Y.*																									
Chicago, Ill	52.1	51.4	50.8	50.6	50.3	49.5	49.0	50.1	51.0	51.6	52.6	53.9	54.6	55.1	56.3	57.8	58.2	56.8	56.1	54.7	53.6	53.0	52.6	52.5	53.1
Cincinnati, Ohio	58.0	57.1	56.4	55.5	54.9	54.5	54.7	55.4	58.2	60.9	63.5	65.3	67.0	68.3	68.7	69.4	69.5	69.0	67.9	66.5	64.4	62.7	61.1	59.4	62.0
Cleveland, Ohio	51.8	51.1	50.3	49.6	48.8	48.7	48.9	50.4	53.0	54.3	55.2	55.6	56.1	56.8	57.3	56.7	56.6	57.0	56.6	55.6	54.5	53.9	53.0	52.4	53.5
Detroit, Mich	47.3	46.8	46.3	46.0	45.5	45.1	45.9	47.4	49.3	51.2	52.9	54.2	55.3	56.3	57.5	57.9	58.0	56.8	55.2	53.5	51.7	50.4	49.2	48.3	51.2
Dodge City, Kans	54.9	53.9	53.1	52.2	51.2	50.1	49.3	48.8	51.3	55.8	59.8	63.0	65.9	68.6	70.4	71.1	70.9	70.9	69.8	67.5	63.4	60.2	58.4	57.0	59.9
Eastport, Me	36.2	35.6	35.2	35.2	35.0	35.4	36.2	37.7	39.1	40.3	41.7	42.7	43.9	44.4	43.9	43.7	42.7	41.3	40.5	39.9	39.1	38.2	37.3	36.8	39.2
Galveston, Tex	67.6	67.6	67.4	67.5	67.4	67.3	67.3	67.4	68.1	68.6	69.1	69.5	69.5	69.6	69.6	69.6	69.5	69.4	68.9	68.4	68.1	68.1	67.9	68.0	68.4
Havre, Mont	35.9	34.1	32.9	31.8	31.0	30.0	29.4	29.4	32.1	34.7	38.5	41.6	44.2	46.1	47.6	49.2	50.0	50.1	49.6	48.7	45.4	42.4	39.8	38.2	39.7
Kansas City, Mo	58.6	57.5	57.0	56.3	55.8	55.1	54.8	55.1	57.1	59.4	61.7	63.6	65.3	65.7	67.4	68.3	69.0	68.8	67.7	66.2	64.2	62.7	61.5	60.0	61.6
Key West, Fla	72.8	72.6	72.5	72.3	72.5	72.4	73.0	74.2	74.8	75.5	76.3	76.6	76.8	76.8	76.8	76.4	76.2	75.4	74.6	74.2	73.9	73.6	73.5	73.2	74.5
Memphis, Tenn	65.9	65.2	64.6	63.8	63.2	62.4	62.2	62.6	64.2	65.9	68.5	70.5	72.3	73.8	74.6	74.6	75.0	74.8	73.9	72.4	70.7	69.6	68.4	67.4	68.6
New Orleans, La	67.2	66.9	66.4	65.6	65.3	65.1	65.1	65.2	67.7	70.3	72.6	74.2	75.3	75.5	75.7	76.0	75.8	75.1	73.4	71.7	70.0	68.8	67.9	67.4	70.2
New York, N. Y	47.3	47.0	46.7	46.3	46.0	45.7	45.8	47.0	48.8	50.9	52.1	52.6	53.4	54.2	54.8	54.3	53.8	52.4	51.6	50.9	50.2	49.6	48.4	47.7	49.9
Philadelphia, Pa	50.5	50.0	49.7	49.4	49.1	48.7	49.3	50.9	52.0	54.1	56.3	58.3	59.6	60.7	61.3	61.5	61.3	59.9	57.9	56.4	54.2	53.1	52.0	50.9	54.5
Pittsburg, Pa	54.1	53.2	52.4	51.8	51.3	50.7	51.2	52.7	55.4	57.5	59.8	61.7	63.1	63.6	64.3	64.7	64.6	63.7	62.0	60.6	58.9	57.2	56.2	55.2	57.7
Portland, Oreg	45.4	44.6	43.9	43.3	42.8	42.3	41.8	41.6	41.4	42.2	43.6	45.1	46.2	48.0	49.4	50.4	51.2	51.6	51.6	51.4	49.7	48.4	47.2	46.3	46.2
St. Louis, Mo	61.3	59.8	58.6	58.0	57.1	56.7	56.5	56.9	58.7	60.9	63.9	66.7	68.5	70.6	71.7	72.2	72.2	71.5	70.2	68.4	66.8	65.5	64.3	63.0	64.2
St. Paul, Minn	44.7	44.0	43.1	42.8	41.9	41.7	41.4	41.9	43.3	45.0	46.9	47.8	49.3	50.8	51.6	52.5	53.1	52.9	52.5	51.5	49.9	48.9	48.0	46.7	47.2
Salt Lake City, Utah	44.0	43.2	42.5	41.9	41.4	41.1	40.8	40.1	40.9	43.4	45.2	48.0	49.5	50.9	51.4	52.2	52.9	53.2	52.6	51.8	49.9	48.0	46.7	45.5	46.5
San Diego, Cal	55.1	54.4	53.6	53.2	52.6	52.1	51.7	51.2	51.4	53.9	56.8	58.9	60.2	61.1	61.7	62.0	62.2	62.0	61.6	60 8	59.7	58.3	57.4	56.3	57.0
San Francisco, Cal	49.7	49.5	49.5	49.2	49.1	48.7	48.4	48.2	47.9	48.7	50.0	51.4	52.4	53.8	54.8	55.2	54.8	54.8	54.2	53.4	52.4	51.2	50.5	50.0	51.2
Savannah, Ga	63.5	63.1	62.6	62.0	61.6	61.2	62.6	65.4	68.5	71.3	73.2	75.0	76.1	75.9	75.4	74.4	72.6	70.8	68.3	66.7	65.5	65.0	64.2	63.8	67.9
Washington, D. C	51.7	50.7	49.8	49.3	48.7	48.4	49.5	51.9	54.5	56.8	58.7	60.9	62.6	63.9	64.7	65.0	64.7	63.4	61.3	59.2	57.0	55.3	54.0	53.0	56.5

*Record incomplete.

TABLE VI.—*Mean pressure for each hour of seventy-fifth meridian time, April, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak	28.152	.155	.146	.144	.136	.139	.149	.151	.152	.149	.145	.143	.137	.127	.121	.117	.111	.110	.110	.111	.121	.131	.134	.131	.134
Boston, Mass	29.963	.961	.962	.965	.972	.989	.995	.999	.001	.995	.988	.976	.962	.950	.935	.932	.933	.935	.945	.957	.965	.965	.969	.968	.966
Buffalo, N. Y	29.259	.253	.249	.249	.254	.265	.274	.279	.278	.277	.275	.269	.265	.256	.247	.243	.243	.242	.243	.249	.259	.259	.259	.258	.259
Chicago, Ill	29.135	.130	.131	.132	.138	.147	.161	.171	.169	.173	.173	.172	.160	.148	.135	.126	.118	.115	.114	.118	.132	.139	.141	.139	.142
Cincinnati, Ohio	29.438	.437	.435	.442	.449	.460	.470	.479	.481	.480	.472	.463	.447	.434	.417	.408	.401	.400	.405	.410	.426	.430	.435	.439	.440
Cleveland, Ohio	29.287	.284	.285	.285	.292	.302	.315	.318	.312	.308	.306	.300	.292	.277	.257	.243	.247	.251	.262	.271	.277	.276	.279	.283	.284
Detroit, Mich	29.293	.290	.291	.290	.293	.298	.308	.316	.313	.315	.313	.311	.300	.293	.277	.268	.263	.265	.267	.270	.285	.291	.292	.293	.291
Dodge City, Kans	27.272	.269	.265	.261	.260	.261	.267	.276	.282	.278	.279	.278	.268	.251	.236	.225	.212	.207	.204	.213	.229	.243	.253	.255	.252
Eastport, Me	29.960	.957	.958	.964	.974	.982	.991	.998	.000	.996	.988	.979	.969	.961	.948	.947	.948	.951	.962	.971	.973	.975	.972	.971	.971
Galveston, Tex	30.067	.061	.053	.050	.049	.054	.065	.076	.083	.091	.097	.100	.094	.087	.072	.058	.045	.040	.040	.041	.050	.062	.066	.068	.065
Havre, Mont	27.279	.283	.282	.281	.280	.281	.280	.283	.292	.293	.295	.293	.284	.272	.258	.247	.238	.229	.228	.225	.231	.245	.259	.255	.266
Kansas City, Mo	28.944	.947	.939	.938	.939	.945	.950	.963	.976	.980	.976	.972	.960	.951	.936	.919	.906	.907	.905	.910	.917	.927	.936	.932	.941
Key West, Fla	30.138	.124	.115	.113	.115	.125	.141	.155	.166	.170	.167	.158	.146	.130	.115	.106	.108	.105	.112	.122	.135	.142	.145	.142	.133
Memphis, Tenn	29.666	.662	.661	.661	.665	.672	.686	.695	.707	.712	.716	.712	.699	.682	.662	.648	.635	.632	.631	.635	.648	.662	.662	.663	.670
New Orleans, La	30.094	.084	.078	.079	.083	.093	.104	.109	.125	.132	.135	.129	.115	.104	.089	.075	.071	.070	.073	.078	.090	.098	.097	.094	.096
New York, N. Y	29.786	.780	.777	.774	.780	.790	.803	.808	.810	.807	.798	.787	.777	.763	.754	.751	.753	.754	.760	.771	.782	.788	.792	.793	.781
Philadelphia, Pa	30.015	.011	.009	.010	.016	.025	.034	.044	.048	.048	.037	.025	.011	.998	.985	.976	.976	.978	.986	.999	.009	.015	.016	.019	.012
Pittsburg, Pa	29.210	.209	.209	.213	.217	.228	.242	.249	.250	.246	.239	.230	.217	.207	.193	.185	.181	.182	.188	.197	.208	.204	.205	.207	.213
Portland, Oreg	29.811	.812	.813	.810	.804	.802	.791	.798	.799	.806	.808	.810	.808	.800	.792	.787	.780	.773	.770	.771	.774	.780	.787	.792	.795
St. Louis, Mo	29.433	.432	.433	.434	.439	.449	.467	.477	.482	.480	.479	.472	.450	.434	.417	.405	.397	.395	.398	.404	.416	.427	.429	.432	.437
St. Paul, Minn	29.039	.044	.041	.042	.041	.040	.050	.058	.053	.050	.054	.053	.041	.032	.028	.017	.010	.014	.011	.009	.020	.028	.035	.039	.035
Salt Lake City, Utah	25.535	.539	.535	.536	.535	.533	.532	.535	.544	.548	.548	.547	.541	.530	.518	.509	.496	.492	.494	.496	.501	.510	.521	.530	.525
San Diego, Cal	29.989	.989	.988	.983	.976	.970	.967	.971	.984	.995	.002	.009	.011	.008	.000	.989	.976	.967	.964	.961	.962	.969	.981	.987	.983
San Francisco Cal	29.919	.916	.916	.912	.905	.900	.897	.898	.913	.928	.934	.939	.946	.946	.940	.933	.927	.915	.907	.900	.896	.897	.905	.914	.917
Savannah, Ga	30.095	.087	.080	.085	.089	.106	.121	.129	.134	.137	.131	.117	.103	.084	.068	.060	.057	.062	.070	.081	.092	.100	.104	.102	.096
Washington, D. C	30.031	.028	.025	.027	.031	.044	.055	.059	.061	.063	.056	.048	.030	.014	.001	.991	.992	.993	.000	.015	.026	.027	.032	.033	.028

TABLE VII.—*Average wind movement for each hour of seventy-fifth meridian time, April, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex.	16.3	15.7	15.0	14.5	13.0	12.2	12.2	12.0	12.7	15.3	16.9	16.8	17.2	16.4	16.7	16.1	16.0	16.5	16.1	15.0	12.7	12.3	13.2	14.3	14.8
Albany, N. Y.	6.6	6.2	5.8	5.6	5.8	6.2	7.4	8.0	8.8	8.9	9.3	9.5	10.0	10.5	10.6	10.1	9.7	8.8	7.3	7.3	7.5	7.6	7.4	7.0	8.0
Alpena, Mich.	8.2	8.7	9.1	9.1	9.1	9.1	9.2	9.8	11.3	12.1	13.0	12.4	13.0	13.4	13.4	12.7	12.3	12.4	10.9	10.3	9.0	8.0	7.8	7.9	10.5
Amarillo, Tex.	20.0	20.9	20.8	20.7	19.7	19.0	17.0	17.6	18.8	21.1	22.1	21.8	22.2	21.8	22.1	22.0	22.5	22.8	22.9	22.1	20.0	20.4	19.4	19.8	20.7
Atlanta, Ga.	9.6	9.8	9.6	9.4	9.9	9.5	9.0	9.1	10.4	10.4	10.8	10.5	11.9	11.0	10.8	10.7	10.7	10.5	8.9	7.6	7.9	8.5	8.8	9.3	9.7
Augusta, Ga.	5.1	4.9	4.1	4.4	3.9	3.8	4.0	4.7	5.7	6.3	7.1	8.0	8.4	8.3	8.6	8.5	8.8	7.4	6.1	5.3	5.3	4.3	4.5	4.7	5.9
Baker City, Oreg.	3.8	3.8	4.3	3.9	3.3	3.7	3.9	3.8	4.0	5.1	5.6	5.7	7.6	8.7	9.8	10.4	9.8	9.5	9.6	9.1	7.7	6.0	4.3	3.8	6.1
Baltimore, Md.	6.7	6.0	6.0	6.4	6.5	6.0	6.2	7.4	8.2	9.2	9.3	10.3	12.0	11.5	11.7	11.4	11.0	9.9	9.3	7.7	7.5	7.7	7.0	6.9	8.4
Bismarck, N. Dak.	10.7	10.0	9.7	9.8	10.2	10.6	10.5	10.7	11.8	13.5	14.9	15.3	15.9	16.4	16.6	16.6	16.4	15.8	15.2	14.7	13.3	12.6	13.0	11.8	13.2
Block Island, R. I.	14.7	13.2	12.7	12.7	12.4	12.8	13.3	13.8	14.4	14.3	13.9	14.8	16.2	16.8	17.3	17.8	18.5	18.0	17.6	17.3	17.6	16.0	15.0	14.4	15.2
Boston, Mass.	9.9	10.2	10.0	9.8	9.6	10.2	10.8	10.8	11.8	12.3	13.1	13.4	13.9	13.8	14.0	14.4	13.4	12.7	12.1	10.7	10.2	9.8	9.1	9.3	11.5
Buffalo, N. Y.	13.6	13.8	13.6	13.5	14.1	14.2	13.5	13.6	14.3	14.2	13.7	14.7	15.1	14.7	14.9	15.3	14.9	14.1	14.1	13.3	13.4	14.2	14.0	13.4	14.1
Cairo, Ill.	9.0	8.8	8.5	8.5	8.3	8.0	8.1	9.1	10.9	11.7	11.9	12.6	12.8	13.2	13.5	13.5	13.3	12.2	11.1	8.9	7.9	8.1	8.6	8.9	10.3
Cape Henry, Va.	13.7	14.5	14.5	13.6	13.6	13.3	13.6	14.3	14.6	12.7	12.5	12.3	13.1	14.3	15.0	13.9	14.3	12.5	11.9	12.6	13.4	13.7	14.0	13.7	13.6
Charleston, S. C.	6.8	6.9	6.7	7.4	7.3	6.9	6.8	8.5	9.2	9.5	10.3	11.7	12.8	13.7	14.0	13.8	13.9	12.7	10.9	9.4	8.3	7.5	7.8	7.3	9.6
Charlotte, N. C.	6.7	6.7	6.2	6.6	6.4	6.5	6.2	6.1	6.9	7.4	7.6	8.1	8.7	8.4	8.5	8.9	8.7	8.5	7.1	5.8	5.7	6.0	6.3	7.1	7.1
Chattanooga, Tenn.	6.7	6.4	6.2	6.3	6.3	6.5	5.6	5.5	6.1	6.9	7.7	8.2	9.1	9.9	10.1	11.1	10.8	9.8	9.0	7.4	6.8	6.2	7.1	6.8	7.6
Cheyenne, Wyo.	9.5	9.0	9.0	9.9	9.9	9.2	8.7	9.6	8.6	8.7	11.0	11.6	14.1	16.2	16.8	17.2	17.9	17.0	16.2	15.6	12.8	9.5	8.5	9.3	11.9
Chicago, Ill.	18.8	19.8	19.5	19.2	19.1	18.6	18.8	18.9	18.6	20.0	19.8	20.0	21.2	21.6	22.2	22.7	22.6	21.1	20.4	18.3	18.0	18.3	19.3	18.8	19.8
Cincinnati, Ohio.	7.0	6.9	6.0	5.8	5.9	5.4	5.8	6.1	8.9	10.2	11.2	11.4	11.9	12.2	12.8	13.1	13.1	12.1	10.3	9.3	8.0	7.9	7.9	7.9	9.0
Cleveland, Ohio.	12.4	12.8	13.2	13.5	13.9	14.4	15.2	14.9	15.0	15.2	15.3	16.0	16.6	16.7	15.7	15.9	15.3	14.0	12.5	12.3	12.4	11.6	11.9	12.1	14.1
Columbia, Mo.	10.9	11.0	10.3	10.1	9.4	9.3	10.2	10.4	11.7	13.1	14.7	14.4	15.0	15.1	15.1	15.1	14.7	13.0	12.1	10.5	9.9	10.7	10.7	11.0	12.0
Columbus, Ohio.	7.0	6.3	5.6	6.5	6.7	6.6	6.1	6.7	8.1	8.7	9.5	9.4	9.5	10.1	10.4	10.7	10.2	8.8	7.9	7.0	7.4	6.7	6.7	6.5	7.9
Concordia, Kans.	12.0	11.2	11.7	11.0	10.4	9.5	9.4	9.7	11.2	13.6	14.0	13.6	13.6	13.9	14.2	14.5	14.2	13.9	13.2	11.0	9.0	9.7	10.7	11.1	11.9
Corpus Christi, Tex.	15.3	14.0	13.1	13.3	13.8	12.5	12.7	11.7	12.7	14.6	15.5	15.7	16.9	17.4	18.0	19.5	20.1	20.1	19.9	19.4	19.2	18.5	17.9	16.6	16.1
Davenport, Iowa.	11.5	11.1	11.2	10.3	10.4	10.3	10.1	11.3	13.0	14.3	15.4	16.7	16.5	16.6	16.5	15.6	16.1	15.6	13.6	12.0	11.6	11.3	11.7	11.2	13.1
Denver, Colo.	8.9	8.0	8.0	7.2	6.9	7.8	7.2	7.0	6.4	6.6	8.7	10.5	10.8	11.4	11.9	13.6	13.8	13.5	13.1	13.2	10.0	8.4	8.5	8.8	9.6
Des Moines, Iowa.	8.9	8.9	9.2	9.7	9.8	10.1	10.2	9.4	10.1	11.6	13.1	14.1	14.4	14.9	14.9	15.2	15.0	13.9	12.4	10.9	9.6	9.6	9.5	8.5	11.4
Detroit, Mich.	9.7	9.5	9.4	9.6	10.1	9.8	10.1	10.4	11.7	12.7	12.7	13.1	13.2	13.4	13.4	13.9	14.0	12.5	11.2	10.1	10.2	9.5	9.9	9.8	11.2
Dodge City, Kans.	15.4	15.3	15.9	16.4	16.0	14.8	12.6	12.2	14.7	17.0	18.8	19.0	19.1	20.4	20.6	21.4	21.0	19.9	20.0	18.1	15.3	14.2	15.4	14.7	17.0
Dubuque, Iowa*.	4.8	5.0	4.6	4.9	4.6	4.7	5.0	5.1	6.0	7.2	8.5	8.2	9.1	9.2	9.1	8.5	7.5	6.8	6.2	4.6	4.2	4.0	4.5	4.9	6.1
Duluth, Minn.	9.9	9.7	10.6	10.9	11.2	10.8	10.7	11.4	12.0	12.5	13.4	13.6	11.9	12.2	11.9	11.9	11.6	11.2	10.5	10.3	10.0	10.7	11.3	9.9	11.5
Eastport, Me.	9.7	9.6	10.2	10.7	10.2	10.0	10.6	11.3	11.3	11.6	11.5	11.9	11.2	11.4	11.6	11.5	10.8	10.2	10.1	10.4	10.8	10.8	10.7	10.6	10.8
Elpaso, Tex.	14.5	15.9	15.4	14.7	12.5	11.3	11.3	10.8	10.7	10.6	11.8	13.3	14.9	16.2	18.1	18.8	18.9	19.8	20.0	19.3	17.0	15.1	14.2	14.3	15.0
Erie, Pa.	9.6	10.0	10.2	10.6	11.0	11.0	11.5	11.3	11.3	12.4	12.0	12.4	12.1	12.5	11.8	11.3	10.1	10.2	8.8	8.8	8.7	9.9	9.4	9.5	10.7
Eureka, Cal.	6.4	6.7	6.3	6.0	6.1	5.5	6.1	5.6	5.5	5.5	5.5	6.4	7.3	8.9	10.7	12.4	13.2	13.4	12.8	12.0	11.1	10.0	8.6	7.9	8.3
Fort Canby, Wash.	12.4	13.1	13.2	12.0	12.2	12.2	12.3	12.6	13.0	13.8	15.0	15.0	14.8	14.3	16.0	16.7	17.8	16.6	16.0	14.8	14.6	12.4	12.1	12.2	14.0
Fort Smith, Ark.	5.7	6.2	6.1	6.2	5.7	6.6	7.0	7.4	8.4	10.0	10.6	10.6	10.8	11.9	12.0	12.8	12.0	10.9	9.2	7.1	7.1	7.8	6.6	6.1	8.5
Fresno, Cal.	7.4	7.3	7.2	6.8	6.4	6.4	5.8	5.6	5.2	5.5	6.4	7.1	7.3	7.4	7.5	7.0	7.1	7.6	8.1	8.9	8.2	7.2	6.7	7.5	7.0
Galveston, Tex.	12.2	11.9	12.1	11.7	11.9	11.5	11.2	11.4	11.9	12.8	13.7	13.6	13.8	13.4	13.6	13.7	13.2	12.8	12.5	12.5	12.4	12.6	12.5	12.5	12.6
Grand Haven, Mich.	12.2	12.2	12.2	11.8	11.4	11.5	11.7	12.9	13.5	14.4	14.9	15.1	14.8	15.3	15.0	15.5	14.1	13.7	12.8	11.7	11.6	11.0	11.0	11.3	13.0
Greenbay, Wis.	8.1	8.2	8.9	7.9	7.7	8.0	7.9	8.1	9.0	9.6	10.1	11.2	11.6	12.7	12.6	13.3	12.7	11.8	11.3	9.9	9.3	8.8	7.7	8.2	9.8
Hannibal, Mo.	10.8	10.1	9.9	9.4	9.6	9.0	9.3	10.0	12.3	13.6	15.5	16.5	16.7	16.5	15.6	14.9	15.1	14.0	11.7	9.7	8.7	8.6	9.6	10.4	12.0
Harrisburg, Pa.	7.0	7.3	6.7	6.8	6.7	6.4	7.1	7.5	7.7	8.5	9.3	9.7	9.8	10.0	9.7	9.9	10.2	9.9	8.9	8.5	7.5	7.6	7.4	7.3	8.2
Hatteras, N. C.	14.2	13.1	12.9	12.8	12.9	13.1	14.5	15.6	16.1	16.7	16.8	17.0	16.7	17.1	17.0	17.1	17.0	16.1	15.7	15.3	15.8	15.0	14.3	14.3	15.3
Havre, Mont.	7.3	7.7	6.9	7.7	7.4	6.7	7.6	7.7	8.2	9.4	10.9	11.8	11.1	12.1	11.5	11.7	11.3	11.6	10.7	11.4	9.5	8.4	8.6	7.8	9.4
Helena, Mont.	6.4	6.3	5.9	6.5	6.6	6.3	5.8	5.8	5.5	5.0	5.1	5.8	8.0	7.8	8.9	9.4	10.5	10.2	10.4	11.3	9.1	8.0	7.4	6.7	7.4
Huron, S. Dak.	14.1	13.1	14.0	13.8	13.8	13.8	12.8	13.9	14.8	17.1	18.8	18.2	17.4	18.7	18.3	18.6	17.9	17.1	16.1	15.6	13.2	13.2	14.0	14.1	15.5
Idaho Falls, Idaho.	8.8	8.4	8.5	8.2	7.9	7.4	7.4	7.6	7.5	8.1	9.0	9.7	9.7	10.7	12.2	12.7	13.2	13.6	14.0	13.7	12.1	10.0	9.4	9.5	10.0
Indianapolis, Ind.	5.7	5.5	5.4	5.5	5.3	5.4	5.9	6.7	7.5	8.2	8.3	9.2	9.3	9.6	9.8	10.5	10.6	9.8	8.5	7.0	6.1	5.8	5.7	6.0	7.4
Jacksonville, Fla.	4.7	4.1	3.6	3.6	3.7	3.8	3.5	3.9	6.2	8.3	8.9	9.2	8.9	9.1	8.8	9.8	10.2	10.3	8.3	6.9	5.8	5.8	5.4	4.7	6.6
Jupiter, Fla.	10.1	10.2	10.2	10.2	10.2	9.8	9.0	9.4	10.5	11.4	11.7	12.6	12.8	12.5	13.1	12.8	12.0	11.8	10.5	10.6	11.4	11.7	11.4	10.7	11.1
Kansas City, Mo.	11.7	10.9	10.4	10.3	10.8	10.3	10.7	10.3	11.8	12.4	13.0	13.0	13.8	14.1	13.7	13.4	13.8	12.6	11.5	10.2	9.8	9.3	9.8	10.5	11.6
Keokuk, Iowa.	9.7	8.7	8.8	8.7	8.6	8.8	8.9	9.6	11.2	12.8	14.1	14.0	14.4	14.1	14.2	14.3	14.1	13.1	11.9	13.1	12.3	8.7	9.3	9.5	11.1
Key West, Fla.	11.2	10.8	11.2	11.1	10.7	10.5	10.1	11.2	12.1	12.4	13.2	12.8	12.6	12.3	12.8	12.5	12.2	12.2	11.5	11.1	10.6	10.9	11.4	11.4	11.6
Kittyhawk, N. C.	13.9	14.1	13.6	14.1	14.4	14.3	14.1	15.5	15.7	15.6	15.6	15.0	14.6	14.3	15.1	16.1	16.6	17.1	16.1	15.3	14.9	15.7	14.4	13.5	15.0
Knoxville, Tenn.	3.9	4.2	3.7	3.4	3.5	3.5	3.5	3.6	5.2	6.0	6.2	6.8	7.8	8.3	8.1	8.2	7.7	7.6	6.6	5.2	4.8	4.5	3.8	3.7	5.4
La Crosse, Wis.	7.1	6.8	7.0	7.0	7.1	6.7	7.1	7.6	8.4	8.9	10.0	9.7	11.0	11.7	11.7	11.2	10.9	10.5	10.0	8.4	8.1	7.5	7.5	7.5	8.7
Lander, Wyo.	3.9	3.7	3.3	3.2	3.2	2.8	2.6	2.6	2.6	3.4	5.0	5.2	6.1	7.2	7.5	8.9	9.5	9.1	8.9	8.3	7.0	6.7	5.1	4.8	5.5
Lexington, Ky.	13.0	12.9	12.6	12.7	12.7	11.9	11.0	11.9	14.0	15.4	15.6	15.2	15.1	15.6	17.5	16.6	16.2	15.1	13.3	12.1	12.2	12.2	12.8	12.4	13.7
Little Rock, Ark.	6.9	6.9	5.6	5.4	5.7	5.5	5.4	5.5	7.3	8.8	10.1	11.0	11.6	11.5	12.0	12.4	11.8	11.0	10.2	7.4	6.6	6.3	6.6	6.6	8.2
Los Angeles, Cal.	2.8	2.8	3.3	3.0	2.7	2.9	2.8	2.8	3.0	3.3	3.5	3.6	4.3	4.6	6.5	7.4	8.5	9.4	8.7	8.3	6.9	4.2	3.0	3.1	4.6
Louisville, Ky.	7.6	7.2	7.6	7.9	7.8	7.3	7.2	7.9	9.4	10.6	11.7	12.3	12.8	13.1	13.2	13.5	13.0	13.1	11.7	9.8	8.7	8.5	8.5	7.9	9.9
Lynchburg, Va.	3.1	2.5	2.5	2.6	3.3	3.7	3.8	4.4	5.1	6.2	6.9	6.9	7.1	7.3	7.7	7.4	7.0	7.2	5.9	4.0	3.7	3.4	3.3	2.9	4.9
Marquette, Mich.	9.1	10.2	9.7	9.7	9.9	9.2	9.0	10.1	11.1	11.9	12.4	13.7	13.1	12.7	12.7	13.3	13.0	12.1	10.4	9.3	7.9	7.9	8.6	9.0	10.7
Memphis, Tenn.	10.4	10.1	9.8	9.4	9.4	9.0	8.4	9.4	10.0	10.5	10.8	11.0	12.2	12.1	13.0	12.7	12.6	11.3	10.9	8.9	9.2	9.7	10.4	10.5	10.5
Meridian, Miss.	4.9	4.3	3.8	3.5	3.3	3.6	4.0	4.7	6.2	6.9	7.4	7.6	8.8	8.7	8.7	9.4	8.7	8.0	6.3	4.1	4.0	4.4	4.4	5.0	5.9
Miles City, Mont.	8.0	7.1	6.6	7.3	6.7	6.6	6.5	6.5	7.3	8.2	9.5	9.8	10.9	10.9	11.5	11.9	11.5	10.7	10.8	10.3	10.1	8.9	8.5	7.7	8.9
Milwaukee, Wis.	9.4	9.5	8.7	8.8	8.8	8.9	9.5	10.1	11.0	12.3	12.8	12.8	13.6	14.5	14.8	14.3	13.8	12.7	11.7	9.9	8.5	8.5	8.4	8.6	10.9
Mobile, Ala.	6.8	6.2	6.3	5.9	6.1	5.8	5.9	6.3	6.8	7.7	8.8	10.1	11.1	12.5	13.6	14.1	13.5	12.6	11.0	8.8	8.1	7.6	7.7	6.5	8.7
Montgomery, Ala.	5.2	5.7	5.6	5.1	4.7	4.8	4.2	4.9	6.3	7.2	7.4	7.9	8.3	8.9	9.2	9.1	8.4	8.0	6.1	5.3	6.1	6.7	6.0	5.8	6.5
Moorhead, Minn.	12.0	10.9	11.1	11.1	11.2	11.3	11.3	12.7	13.3	14.3	14.6	15.2	15.2	15.8	15.1	15.1	14.7	13.2	12.6	11.5	10.6	11.0	11.3	12.9	
Nantucket, Mass.	10.6	10.8	11.1	11.0	10.6	10.8	11.3	12.5	13.2	13.8	14.0	14.8	14.9	14.8	15.1	14.1	13.2	12.1	11.1	11.4	11.2	11.0	11.0	10.5	12.3
Nashville, Tenn.	6.0	5.6	5.5	5.3	4.9	5.1	5.0	6.0	7.8	8.4	9.0	10.3	11.9	11.9	13.2	12.4	12.5	11.4	9.9	7.9	8.0	7.3	6.9	6.2	8.2
New Haven, Conn.	6.0	6.3	6.2	5.9	5.9	6.6	6.9	8.7	9.6	10.7	12.7	13.0	13.2	13.4	13.2	12.9	12.8	10.8	9.8	9.5	8.2	7.1	6.9	6.1	9.3
New Orleans, La.	7.5	7.0	6.9	6.5	6.3	6.2	5.8	6.3	7.9	9.9	11.1	11.4	11.4	11.4	11.3	11.0	11.2	11.0	10.4	9.4	8.2	7.7	7.5	7.3	8.8
New York, N. Y.	12.7	11.4	10.0	9.9	10.4	11.3	12.1	12.3	11.9	11.7	12.9	14.2	14.8	15.1	15.7	16.3	16.4	15.6	14.9	14.8	15.1	13.7	12.7	12.4	13.3
Norfolk, Va.	8.3	8.0	7.9	7.4	6.8	6.4	7.2	8.4	9.7	9.5	9.7	9.5	10.2	10.9	10.2	10.9	10.7	10.4	9.0	8.1	8.6	8.0	8.6	8.2	8.9
Northfield, Vt.	7.0	7.9	8.2	7.5	6.5	6.6	6.3	7.1	7.7	9.1	10.4	10.7	10.9	11.4	10.9	9.8	9.2	9.3	7.9	6.7	7.3	7.7	7.8	7.2	8.4
North Platte, Nebr.	12.3	12.9	12.4	10.8	11.5	11.7	11.3	10.7	11.2	14.6	15.1	14.8	15.4	15.9	15.4	15.8	14.5	14.2	13.8	12.0	11.6	12.5	12.5	13.3	
Oklahoma, Okla.	13.9	12.4	12.4	12.3	12.1	12.3	11.6	12.3	13.7	15.2	16.2	16.2	16.8	17.5	17.7	18.1	18.0	17.6	16.3	13.9	11.3	11.0	12.0	11.7	14.2
Omaha, Nebr.	9.2	9.0	9.7	9.5	9.3	9.4	8.8	8.7	9.8	10.7	12.0	11.6	13.2	12.8	12.8	13.0	12.3	11.8	11.7	10.4	9.3	9.3	9.0	9.4	10.5
Oswego, N. Y.	9.7	10.1	10.1	10.1	10.2	10.4	10.1	10.7	10.8	11.5	11.5	11.3	11.6	12.0	11.6	11.7	11.5	10.7	9.4	9.3	9.6	9.7	10.0	10.3	10.6
Palestine, Tex.	7.7	7.8	7.5	7.7	7.1	6.7	6.6	6.5	7.4	8.9	10.3	10.6	11.3	11.4	11.9	11.8	12.1	11.4	10.1	8.1	7.4	7.4	8.1	8.3	8.9
Parkersburg, W. Va.	4.7	4.5	4.4	4.7	4.2	3.9	3.9	4.6	5.7	6.5	7.6	7.4	8.5	9.1	8.9	8.8	8.6	7.7	6.4	6.1	5.7	5.2	5.1	4.8	6.1

*Record for 20½ days.

TABLE VII.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Pensacola, Fla.	8.5	8.2	7.5	7.4	7.7	7.9	8.3	8.2	9.4	10.4	11.1	11.7	12.0	13.0	13.1	13.2	13.0	12.5	11.2	8.9	7.8	7.4	8.5	8.2	9.8
Philadelphia, Pa.	8.9	8.6	8.4	8.2	7.7	7.7	8.3	9.9	11.2	10.9	11.1	11.5	11.8	12.2	12.5	12.4	13.1	12.4	11.0	11.0	10.3	9.5	9.6	9.2	10.3
Phœnix, Ariz	4.5	4.5	3.7	4.2	4.7	5.1	5.5	5.2	5.1	5.6	6.6	6.6	6.2	6.5	7.5	7.9	8.6	8.5	8.5	7.5	5.4	5.1	5.0	4.7	6.0
Pierre, S. Dak.	12.9	11.6	10.8	10.4	10.8	10.7	10.3	9.9	10.8	11.4	12.6	13.4	13.8	14.0	13.2	14.0	13.7	13.9	14.2	14.0	13.7	12.6	13.5	13.3	12.5
Pittsburg, Pa.	4.7	4.8	4.7	4.8	5.0	5.2	5.7	6.0	7.1	8.2	8.7	8.2	8.5	9.2	8.8	9.3	8.6	7.7	6.8	6.2	5.0	5.3	5.5	5.5	6.6
Port Angeles, Wash.	5.3	4.9	5.2	5.3	5.2	4.7	4.6	5.0	5.1	4.6	4.0	4.8	6.8	7.6	7.4	7.7	8.4	8.3	7.3	7.7	7.8	7.3	6.1	5.5	6.1
Port Huron, Mich.	10.8	10.0	10.0	11.1	11.2	11.1	11.7	12.0	13.3	13.7	14.1	14.2	14.1	13.9	14.3	14.5	13.1	12.2	11.1	10.3	10.2	10.6	10.3	10.0	12.0
Portland, Me.	5.7	6.2	6.3	6.0	6.3	6.1	6.7	8.0	8.9	9.1	10.1	9.9	10.9	10.2	10.6	10.1	9.3	8.2	6.8	6.0	6.2	5.7	5.7	6.0	7.7
Portland, Oreg.	8.2	7.6	8.4	7.5	7.5	8.0	8.5	8.5	8.4	8.7	9.0	9.8	10.8	11.2	11.2	12.1	12.7	12.3	11.7	11.6	10.8	10.4	9.5	8.9	9.7
Pueblo, Colo.	10.8	9.8	8.6	9.1	8.6	7.2	7.4	7.0	6.9	7.7	10.0	10.7	12.0	12.5	13.9	13.9	15.8	17.4	16.9	16.7	13.3	11.0	10.2	11.1	11.2
Raleigh, N. C.	5.5	5.3	5.1	5.0	5.1	5.0	5.0	6.8	7.8	8.1	8.4	8.3	8.6	8.9	8.3	8.5	8.0	7.5	5.6	5.6	6.0	5.3	5.2	5.2	6.6
Rapid City, S. Dak.	10.0	9.7	10.2	9.4	9.5	9.2	9.1	9.0	8.8	8.8	10.0	12.2	12.7	13.4	13.7	13.6	13.7	12.9	12.7	12.3	9.5	9.4	9.1	9.4	10.8
Redbluff, Cal.	6.7	6.7	6.4	6.5	7.0	6.8	6.8	6.8	6.8	7.0	7.6	9.0	9.7	10.0	10.1	10.7	10.5	10.2	9.6	9.6	8.8	7.0	7.0	7.1	8.1
Rochester, N. Y.	6.5	6.4	6.9	7.1	7.0	6.6	7.0	8.1	8.2	8.6	9.3	10.6	11.3	11.3	11.5	10.5	10.0	8.9	7.9	7.3	7.2	6.8	6.0	6.1	8.2
Roseburg, Oreg.	3.3	3.3	2.5	2.7	2.1	2.9	2.4	2.5	2.7	2.7	3.2	4.0	4.8	5.7	5.9	7.1	7.5	8.6	8.3	8.0	7.3	5.7	4.0	4.0	4.6
Sacramento, Cal.	8.5	8.1	7.6	8.1	8.9	9.4	8.4	7.8	7.8	7.7	7.8	8.0	9.0	10.8	11.3	11.9	12.2	11.9	11.6	11.6	10.7	10.1	9.7	9.9	9.5
St. Louis, Mo.	12.5	12.4	12.1	12.0	11.6	12.1	11.9	12.7	14.0	15.0	15.5	15.6	15.9	16.6	16.8	16.7	17.4	16.7	15.8	14.1	13.0	12.9	12.8	12.0	14.1
St. Paul, Minn.	7.2	6.5	7.9	8.3	7.9	8.2	7.2	7.7	9.4	10.0	10.7	11.6	11.7	12.2	11.9	11.5	10.5	9.9	8.6	8.0	7.6	7.2	7.2	6.7	9.0
Salt Lake City, Utah.	5.5	5.8	5.8	4.7	4.7	5.1	4.9	5.0	5.0	5.4	7.8	9.2	11.8	12.5	13.2	13.0	12.2	12.2	12.2	10.9	8.1	5.6	5.2	5.1	7.9
San Antonio, Tex.	9.8	8.8	8.3	7.8	7.7	7.1	6.6	6.9	8.2	9.8	11.3	11.8	11.7	12.3	12.3	12.5	13.0	13.1	13.7	13.2	12.5	11.7	10.9	10.1	10.5
San Diego, Cal.	3.7	3.9	3.9	4.0	4.1	4.1	4.2	3.9	4.2	4.2	4.4	5.2	7.4	9.3	11.0	11.5	11.4	11.6	11.1	9.8	8.0	6.3	4.6	4.3	6.5
Sandusky, Ohio	9.5	9.4	8.9	9.2	9.9	9.6	9.7	10.0	9.7	10.3	10.7	10.7	10.9	11.5	11.7	12.2	11.9	11.6	11.1	10.2	9.8	9.3	9.0	9.2	10.2
San Francisco, Cal.	9.6	9.3	7.9	8.1	8.2	8.5	7.6	7.1	7.1	7.1	8.6	8.6	9.9	11.1	12.8	16.6	17.9	18.3	17.4	17.9	17.2	16.1	13.7	11.7	11.6
San Luis Obispo, Cal.	4.0	3.8	3.8	3.7	3.9	3.9	3.4	4.0	4.2	4.0	5.0	6.3	7.1	7.9	9.4	10.7	11.9	12.6	11.1	10.8	10.2	7.7	5.4	4.7	6.6
Santa Fe, N. Mex.	6.6	6.7	5.9	4.8	4.8	5.2	5.2	5.3	5.5	6.1	8.4	10.7	11.6	13.7	15.2	16.2	16.5	16.1	14.8	15.0	11.1	7.5	7.0	6.6	9.4
Sault Ste Marie, Mich.	7.1	7.5	7.5	7.3	7.5	7.8	7.8	8.4	9.4	10.1	11.0	11.0	12.6	12.9	13.1	13.9	13.2	11.3	10.1	8.5	7.5	6.9	6.4	6.4	9.4
Savannah, Ga.	7.7	6.9	7.0	6.2	6.7	6.6	6.5	7.5	9.5	10.2	10.3	10.3	10.7	12.0	12.7	13.6	12.8	12.1	11.0	9.5	8.4	8.1	8.2	7.9	9.3
Seattle, Wash.	6.9	6.6	6.2	6.0	5.8	5.8	5.9	5.9	5.7	6.0	6.1	6.5	6.5	6.7	7.7	8.0	8.2	8.1	8.6	8.8	8.8	8.1	7.0	7.3	7.0
Shreveport, La.	7.7	7.7	7.1	6.8	6.9	6.6	6.0	6.4	8.3	9.2	10.3	10.3	10.2	9.9	10.2	10.0	10.1	10.7	9.5	7.2	7.5	7.9	8.5	8.5	8.5
Sioux City, Iowa.	14.6	13.5	12.4	12.7	13.0	13.0	11.4	12.1	12.9	14.1	15.2	14.5	14.7	14.9	15.8	15.9	15.7	15.8	15.2	14.2	12.2	12.2	11.8	13.7	13.8
Spokane, Wash.	6.4	6.0	6.1	6.0	5.8	6.5	6.5	6.1	6.1	6.7	7.2	7.1	8.7	9.2	9.0	9.1	9.5	9.0	8.8	8.5	7.2	6.8	6.7	6.4	7.3
Springfield, Ill.	11.5	11.7	10.5	10.1	10.7	10.5	10.9	11.0	13.0	14.8	16.1	15.9	16.1	17.0	17.0	17.8	17.4	16.1	14.0	11.6	10.7	10.7	11.4	11.5	13.2
Springfield, Mo.	12.2	12.7	12.5	12.2	12.5	12.2	12.0	13.2	14.8	15.9	16.5	16.9	17.2	16.3	16.9	16.7	16.0	15.4	13.5	13.2	12.5	12.6	12.7	12.5	14.1
Tampa, Fla.	4.6	4.1	3.8	3.8	4.2	4.1	3.7	5.0	6.5	7.7	7.8	7.7	7.7	8.2	9.0	9.1	9.2	8.5	7.4	5.7	5.4	5.2	4.7	4.9	6.2
Tatoosh Island, Wash.	12.6	11.8	11.6	11.7	11.7	11.3	10.6	12.2	12.6	12.7	12.4	12.2	12.6	13.3	13.8	14.1	13.7	13.4	13.1	13.6	13.7	14.0	14.0	13.6	12.8
Toledo, Ohio.	9.1	9.3	9.3	9.2	9.1	8.9	9.2	10.2	11.6	11.5	12.8	12.7	13.3	14.2	14.5	15.4	14.8	13.8	11.9	11.4	10.3	10.0	10.2	10.1	11.4
Vicksburg, Miss.	7.6	7.5	7.7	6.7	6.7	6.6	6.1	6.2	6.9	7.9	8.0	8.2	9.1	9.6	9.6	9.7	9.8	9.1	8.1	7.0	7.6	7.3	7.8	7.7	7.9
Vineyard Haven, Mass	8.4	7.8	8.1	7.8	8.0	8.0	8.4	9.7	10.1	10.8	10.8	10.9	11.7	12.3	12.2	11.9	11.5	10.4	9.6	9.1	8.8	8.6	8.9	8.7	9.7
Walla Walla, Wash.	6.1	6.1	6.5	6.0	5.8	6.5	6.5	6.1	6.2	6.8	7.5	7.2	7.1	7.6	7.6	8.0	8.0	8.7	8.6	7.8	7.6	7.4	6.7	6.4	7.0
Washington, D. C.	5.7	5.0	4.6	5.3	5.5	5.6	5.7	6.6	7.6	8.3	9.6	9.8	10.3	10.9	11.1	10.7	10.0	9.5	8.5	7.0	6.2	6.4	6.0	5.7	7.6
Wichita, Kans.	12.5	13.0	12.7	12.1	11.9	12.3	11.5	11.9	13.3	13.6	15.3	15.3	16.2	16.6	17.1	17.1	17.5	17.6	15.6	13.7	12.0	11.7	11.8	11.7	13.9
Williston, N. Dak.	9.1	9.4	8.8	9.2	9.0	9.3	9.0	9.1	9.1	10.6	12.5	13.8	14.2	15.3	15.4	14.5	15.0	14.3	13.6	13.1	10.8	9.9	10.7	10.1	11.5
Wilmington, N. C.	7.5	7.5	7.1	6.7	7.3	7.2	7.2	8.4	9.7	10.3	10.6	10.9	12.3	13.4	14.4	14.7	14.8	14.1	11.7	9.4	8.4	8.1	8.4	8.0	9.9
Winnemucca, Nev.	8.9	8.7	8.6	9.1	9.1	8.5	8.6	8.2	8.0	8.6	10.8	12.8	13.5	15.1	16.0	15.7	16.9	17.0	15.1	14.8	13.5	11.3	9.3	9.0	11.5
Woods Hole, Mass.	11.7	11.5	11.8	10.8	11.0	10.6	11.4	12.2	13.4	14.0	14.0	15.4	16.2	16.7	16.1	15.7	15.3	15.3	14.5	12.9	13.6	13.9	13.0	12.7	13.5
Yuma, Ariz.	9.6	8.9	7.4	8.1	7.4	7.0	6.6	6.3	6.0	6.1	7.7	9.7	10.8	11.2	10.7	11.2	11.0	10.6	11.2	11.5	11.6	10.9	10.4	10.2	9.2

TABLE VIII.—*Heights of rivers above low-water mark, April*, 1896.

Stations.	Distance to mouth of river.	Danger-point on gauge.	Highest water.		Lowest water.		Me'n stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.	2,057	14.0	10.7	18	— 0.1	3	5.5	10.8
La Crosse, Wis.	1,867	10.0	10.8	25, 26	0.8	1	5.2	10.0
Dubuque, Iowa.	1,759	15.0	12.8	30	0.7	1	4.2	12.1
Davenport, Iowa.	1,653	15.0	8.8	30	0.7	8	2.7	8.1
Keokuk, Iowa.	1,523	14.0	6.9	30	0.3	1-5	2.2	6.6
Hannibal, Mo.	1,462	17.0	6.6	30	0.5	5	2.6	6.1
St. Louis, Mo.	1,321	30.0	13.2	13	5.8	8	9.6	7.4
Memphis, Tenn.	910	33.0	29.5	16	10.5	30	22.1	19.0
Helena, Ark.	834	37.0	38.4	17	17.5	30	27.9	20.9
Arkansas City, Ark.	702	42.0	40.1	19	24.1	30	35.3	16.0
Greenville, Miss.	662	40.0	34.6	20	20.4	30	30.3	14.2
Vicksburg, Miss.	541	41.0	39.0	21, 22	28.6	30	35.1	10.4
New Orleans, La.	108	13.0	14.7	23	10.5	1	13.3	4.2
Missouri River.								
Pierre, S. Dak.	1,132	13.0	8.9	4	2.1	27, 28	3.7	6.8
Sioux City, Iowa.	802	18.7	13.6	5	7.5	24, 25, 27	8.9	6.1
Omaha, Nebr.	667	18.0	13.4	6	7.4	1, 2	9.5	6.0
Kansas City, Mo.	386	21.0	16.0	10	7.9	3	11.4	8.1
Ohio River.								
Parkersburg, W. Va.	786	38.0	30.0	2	9.5	30	14.3	20.5
Catlettsburg, Ky.	652	50.0	46.5	2, 3	12.6	23	22.3	33.9
Cincinnati, Ohio.	500	45.0	47.7	4	15.5	25	26.1	32.2
Louisville, Ky.	368	24.0	22.6	5	7.3	26	11.4	15.3
Evansville, Ind.	184	30.0	38.0	7, 8	11.9	28	22.9	26.1
Paducah, Ky.	47	40.0	37.3	11	10.5	28	23.9	26.8
Cairo, Ill.	1,140*	40.0	39.2	13	17.3	28	28.9	21.9
Monongahela River.								
Pittsburg, Pa.	966†	22.0	19.6	1	4.6	30	8.5	15.0
Great Kanawha River.								
Charleston, W. Va.	61	30.0	23.7	1	4.5	20-25	7.8	19.2

Stations.	Distance to mouth of river.	Danger-point on gauge.	Highest water.		Lowest water.		Me'n stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Big Sandy River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Louisa, Ky.	26	.....	36.0	1	4.3	27	9.7	31.7
Wabash River.								
Mount Carmel, Ill.	50	15.0	9.7	2	2.5	25	4.8	7.2
Cumberland River.								
Burnside, Ky.	404	50.0	54.6	2	2.3	30	10.7	52.3
Nashville, Tenn.	145	40.0	42.9	7	4.9	25	17.9	38.0
Tennessee River.								
Knoxville, Tenn.	640	29.0	.....	.....	.....	.....	.....	.....
Chattanooga, Tenn.	455	33.0	40.5	5	3.6	30	11.3	36.9
Johnsonville, Tenn.	94	21.0	28.3	12	5.3	26	15.4	23.0
Arkansas River.								
Fort Smith, Ark.	351	22.0	8.7	30	3.6	13	5.1	5.1
Little Rock, Ark.	176	23.0	14.5	3	7.2	22	9.2	7.3
Red River.								
Shreveport, La.	449	29.2	12.1	1	4.9	30	9.4	7.2
James River.								
Lynchburg, Va.	251	18.0	7.5	2	1.1	19-23	2.3	6.4
Congaree River.								
Columbia, S. C.	.....	15.0	1.9	4,5	0.2	21, 22	0.9	1.7
Savannah River.								
Augusta, Ga.	140	32.6	9.6	3	5.8	22, 23	6.9	3.8
Alabama River.								
Montgomery, Ala.	215	48.0	10.6	5	2.4	27	4.9	8.2
Willamette River.								
Portland, Oreg.	.....	15.0	12.9	16	4.8	7	7.8	8.1
Sacramento River.								
Redbluff, Cal.	.....	20.0	15.3	25	5.1	21	7.8	10.2
Sacramento, Cal.	.....	28.0	22.2	27	20.5	23	21.4	1.7

*To mouth of Mississippi River. †To mouth of Ohio River.

TABLE IX.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during April, 1896.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	24	14	16	18	n. 11 w.	10
Portland, Me	20	19	8	20	n. 85 w.	12
Northfield, Vt	26	30	4	5	s. 14 w.	4
Boston, Mass	20	12	20	21	n. 7 w.	8
Nantucket, Mass	24	14	16	19	n. 17 w.	10
Woods Hole, Mass.*	5	15	8	8	s.	10
Block Island, R. I	15	13	24	21	n. 56 e.	4
New Haven, Conn	19	22	16	15	s. 18 e.	3
Middle Atlantic States.						
Albany, N. Y	21	23	8	16	s. 76 w.	8
New York, N. Y	23	16	14	20	n. 41 w.	9
Harrisburg, Pa	9	14	24	20	s. 39 e.	6
Philadelphia, Pa	21	17	18	20	n. 27 w.	4
Bal' more, Md	19	24	16	20	s. 39 w.	6
Washington, D. C	20	20	18	18	0.	0
Lynchburg, Va	18	21	20	18	s. 34 e.	4
Norfolk, Va	18	21	21	12	s. 72 e.	9
South Atlantic States.						
Charlotte, N. C	12	32	16	11	s. 14 e.	21
Hatteras, N. C	22	19	14	22	n. 69 w.	8
Kittyhawk, N. C	17	23	19	22	s. 27 w.	7
Raleigh, N. C	18	24	11	19	s. 53 w.	10
Wilmington, N. C	14	23	15	25	s. 48 w.	14
Charleston, S. C	6	28	20	18	s. 5 e.	22
Augusta, Ga	11	27	25	14	s. 34 e.	19
Savannah, Ga	10	26	20	13	s. 24 e.	18
Jacksonville, Fla	13	25	29	13	s. 53 e.	20
Florida Peninsula.						
Jupiter, Fla	15	13	34	7	n. 86 e.	27
Key West, Fla	18	3	46	3	n. 71 e.	46
Tampa, Fla	22	3	27	17	n. 28 e.	22
Eastern Gulf States.						
Atlanta, Ga	13	20	16	24	s. 49 w.	11
Pensacola, Fla	10	33	16	18	s. 5 w.	23
Mobile, Ala	12	35	17	10	s. 17 e.	24
Montgomery, Ala	12	22	22	22	s.	10
Meridian, Miss	7	40	13	14	s. 2 w.	33
Vicksburg, Miss	4	29	18	13	s. 8 e.	35
New Orleans, La	4	36	30	8	s. 34 e.	39
Western Gulf States.						
Shreveport, La	5	45	16	7	s. 13 e.	41
Fort Smith, Ark	5	25	32	8	s. 50 e.	31
Little Rock, Ark	4	42	10	12	s. 3 w.	38
Corpus Christi, Tex	5	35	40	1	s. 52 e.	40
Galveston, Tex	3	40	28	2	s. 35 e.	45
Palestine, Tex	5	46	11	6	s. 7 e.	41
San Antonio, Tex	8	29	35	3	s. 56 e.	38
Ohio Valley and Tennessee.						
Chattanooga, Tenn	14	21	15	24	s. 52 w.	11
Knoxville, Tenn	15	2	14	36	n. 60 w.	26
Memphis, Tenn	4	27	32	10	s. 44 e.	32
Nashville, Tenn	8	34	20	13	s. 15 e.	27
Lexington, Ky	8	30	13	26	s. 30 w.	26
Louisville, Ky	9	34	16	13	s. 7 e.	25
Indianapolis, Ind	13	29	18	17	s. 3 e.	16
Cincinnati, Ohio	12	29	19	15	s. 13 e.	18
Columbus, Ohio	11	24	17	19	s. 9 w.	13
Pittsburg, Pa	15	22	13	23	s. 55 w.	12
Parkersburg, W. Va	14	21	20	19	s. 8 e.	7
Lower Lake Region.						
Buffalo, N. Y	8	34	15	28	s. 39 w.	21
Oswego, N. Y	10	28	15	19	s. 13 w.	18
Rochester, N. Y	10	25	12	28	s. 47 w.	22
Erie, Pa	12	22	11	30	s. 62 w.	22
Cleveland, Ohio	14	25	21	19	s. 10 e.	11
Sandusky, Ohio	13	17	19	22	s. 37 w.	5
Toledo, Ohio	12	17	18	27	s. 61 w.	10
Detroit, Mich	13	19	19	25	s. 45 w.	8
Upper Lake Region.						
Alpena, Mich	15	19	21	15	s. 56 e.	7
Grand Haven, Mich	6	26	16	13	s. 9 e.	20
Marquette, Mich	17	22	18	20	n. 22 w.	5
Port Huron, Mich	17	27	16	14	s. 11 e.	10
Sault Ste. Marie, Mich	12	29	19	19	s.	15
Chicago, Ill	12	28	15	15	s.	16
Milwaukee, Wis	18	19	21	14	s. 82 e.	7
Greenbay, Wis	16	19	20	15	s. 59 e.	6
Duluth, Minn	32	7	25	15	n. 22 e.	27
North Dakota.						
Moorhead, Minn	22	18	16	16	n.	4
Bismarck, N. Dak	27	14	22	9	n. 45 e.	18
Williston, N. Dak	28	10	15	21	n. 18 w.	19
Upper Mississippi Valley.						
St. Paul, Minn	13	20	22	21	s. 8 e.	7
La Crosse, Wis	10	12	9	5	s. 63 e.	4
Davenport, Iowa	14	25	22	15	s. 32 e.	13
Des Moines, Iowa	15	22	21	16	s. 36 e.	9
Keokuk, Iowa	9	29	15	19	s. 11 w.	20
Cairo, Ill	12	34	16	12	s. 10 e.	22
Springfield, Ill	8	34	9	15	s. 11 w.	32
Hannibal Mo	10	34	17	14	s. 7 e.	24
St. Louis, Mo	9	34	19	11	s. 18 e.	26
Missouri Valley.						
Columbia, Mo.*	5	16	12	8	s. 20 e.	12
Kansas City, Mo	8	34	22	10	s. 25 e.	29
Springfield, Mo	5	37	24	9	s. 25 e.	35
Omaha, Nebr	18	17	21	17	n. 76 e.	4
Sioux City, Iowa	11	9	11	5	n. 72 e.	6
Pierre, S. Dak	26	8	23	15	n. 24 e.	20
Huron, S. Dak	25	20	19	13	n. 50 e.	8
Northern Slope.						
Havre, Mont	17	17	14	27	w.	13
Miles City, Mont	23	12	14	22	n. 36 w.	14
Helena, Mont	12	22	3	37	s. 74 w.	35
Rapid City, S. Dak	23	15	8	24	n. 63 w.	18
Cheyenne, Wyo	22	15	5	29	n. 74 w.	25
Lander, Wyo	16	24	9	29	s. 68 w.	22
North Platte, Nebr	18	18	21	19	e.	3
Middle Slope.						
Denver, Colo	21	24	18	14	s. 53 e.	5
Pueblo, Colo	15	19	16	21	s. 51 w.	6
Concordia, Kans	8	34	18	12	s. 13 e.	27
Dodge City, Kans	14	29	19	14	s. 18 e.	16
Wichita, Kans	11	39	12	9	s. 6 e.	28
Oklahoma, Okla	7	44	9	7	s. 3 e.	37
Southern Slope.						
Abilene, Tex	6	41	18	10	s. 13 e.	36
Amarillo, Tex	6	41	1	18	s. 26 w.	39
Southern Plateau.						
Elpaso, Tex	19	10	10	18	n. 42 w.	12
Santa Fe, N. Mex	11	28	19	33	s. 13 w.	18
Phœnix, Ariz	9	18	12	31	s. 65 w.	21
Yuma, Ariz	17	14	11	27	n. 79 w.	16
Middle Plateau.						
Carson City, Nev	15	19	5	35	s. 82 w.	30
Winnemucca, Nev	11	24	12	26	s. 47 w.	19
Salt Lake City, Utah	18	20	17	22	s. 68 w.	5
Northern Plateau.						
Baker City, Oreg	17	28	14	18	s. 20 w.	12
Idaho Falls, Idaho	17	34	6	7	s. 3 w.	17
Spokane, Wash	11	34	15	18	s. 7 w.	23
Walla Walla, Wash	10	37	11	10	s. 2 e.	27
North Pacific Coast Region.						
Fort Canby, Wash	11	20	13	8	s. 29 e.	10
Port Angeles, Wash	6	25	14	21	s. 38 w.	11
Seattle, Wash	13	30	15	14	s. 3 e.	17
Tatoosh Island, Wash	4	20	24	22	s. 7 e.	16
Portland, Oreg	13	31	14	18	s. 13 w.	18
Roseburg, Oreg	11	26	12	25	s. 41 w.	20
Middle Pacific Coast Region.						
Eureka, Cal	14	25	23	18	s. 23 e.	13
Redbluff, Cal	10	29	20	18	s. 6 e.	19
Sacramento, Cal	7	35	12	23	s. 22 w.	30
San Francisco, Cal	7	14	3	43	s. 80 w.	41
South Pacific Coast Region.						
Fresno, Cal	20	8	11	34	n. 62 w.	26
Los Angeles, Cal	17	1	20	30	n. 32 w.	19
San Diego, Cal	24	7	13	32	n. 48 w.	26
San Luis Obispo, Cal	20	10	8	31	n. 67 w.	25

*From observations at 8 p. m. only.

TABLE X.—*Thunderstorms and auroras, April, 1896.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	56	T.	7	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	3	....	....	....	6	....	....	9	....	....	27	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arizona	49	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arkansas	51	T.	3	....	....	....	....	1	1	4	3	....	....	1	2	....	1	....	....	3	1	....	3	1	4	4	5	7	....	4	3	2	....	53	19	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
California	202	T.	....	....	....	....	....	....	....	....	2	3	....	....	....	....	1	2	....	3	....	....	2	....	....	10	....	1	....	....	2	....	....	26	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Colorado	80	T.	....	....	....	1	....	....	....	....	....	....	1	1	....	....	....	1	1	....	....	....	....	....	....	....	....	....	2	1	....	....	....	8	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Connecticut	18	T.	....	....	1	1	1	....	....	....	....	1	....	....	....	....	....	....	14	1	6	1	10	4	1	....	....	....	....	....	....	....	....	37	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	4	A.
Delaware	6	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	1	1	....	....	....	....	....	....	....	....	....	....	5	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Dist. of Columbia	4	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Florida	38	T.	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	11	3	....	1	1	....	24	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Georgia	44	T.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	4	5	2	....	1	1	3	....	27	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Idaho	38	T.	....	....	....	4	....	3	1	....	1	....	....	....	2	....	....	....	....	....	....	....	....	1	....	2	1	2	1	....	2	....	....	20	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	1	A.
Illinois	100	T.	1	....	....	....	....	1	....	2	4	16	2	1	18	....	....	....	6	3	....	26	4	3	23	5	....	14	1	7	41	....	....	178	19	T.
		A.	....	....	3	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	2	1	....	....	....	....	....	....	1	....	....	9	6	A.
Indiana	41	T.	....	....	....	....	2	....	....	1	....	....	3	....	....	....	....	....	....	....	....	11	3	1	8	1	....	3	1	....	5	....	....	39	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	1	A.
Indian Territory	9	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Iowa	101	T.	....	....	....	1	....	....	18	10	3	19	5	4	8	....	....	3	11	5	3	15	1	5	18	1	11	23	7	33	11	3	....	218	23	T.
		A.	....	....	2	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	6	4	A.
Kansas	90	T.	....	....	....	....	12	1	10	10	....	1	13	7	....	....	....	7	6	2	....	3	1	4	3	10	6	5	1	14	1	5	....	122	21	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Kentucky	46	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	4	3	6	5	....	5	....	1	1	1	....	27	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	2	2	A.
Louisiana	46	T.	2	1	....	....	....	....	....	1	7	....	....	5	10	10	....	....	....	....	....	....	....	....	....	1	....	....	....	4	1	....	....	42	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maine	17	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	9	2	T.
		A.	....	....	3	2	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	9	4	A.
Maryland	42	T.	....	....	....	....	....	1	....	....	....	....	6	4	....	....	....	....	....	5	8	1	....	....	....	8	1	....	....	1	....	....	....	35	9	T.
		A.	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	1	....	3	3	A.
Massachusetts	82	T.	....	....	3	....	....	....	1	1	....	....	....	....	....	....	....	....	36	9	37	1	2	2	....	....	....	2	....	....	....	....	....	80	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	3	A.
Michigan	79	T.	1	....	....	....	....	....	....	....	1	15	14	5	5	2	1	1	20	4	3	11	5	1	11	7	....	3	2	5	10	2	....	129	22	T.
		A.	1	....	4	7	1	1	....	1	1	....	....	....	....	....	....	....	2	....	....	....	9	2	....	....	1	....	....	....	....	....	....	30	11	A.
Minnesota	74	T.	2	....	....	....	....	....	....	....	2	12	25	3	13	3	1	6	18	5	2	4	..	2	21	....	21	14	15	21	14	....	....	204	20	T.
		A.	....	....	10	6	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	3	9	....	....	....	2	4	....	....	17	3	....	61	11	A.
Mississippi	47	T.	6	....	....	....	....	2	2	....	....	....	....	1	14	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Missouri	103	T.	1	....	....	....	12	7	12	26	11	2	1	2	....	....	....	3	5	7	3	14	10	19	8	16	14	28	....	28	12	8	....	249	23	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Montana	42	T.	....	....	....	....	....	1	....	....	....	....	....	....	1	2	....	....	....	....	....	....	1	3	1	2	....	1	1	....	....	....	....	13	9	T.
		A.	1	....	4	3	2	....	....	1	....	1	1	....	....	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	15	9	A.
Nebraska	130	T.	....	....	....	1	1	9	14	3	11	21	14	4	....	....	15	18	2	4	2	....	7	1	6	3	3	4	13	3	10	....	169	23	T.
		A.	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	A.
Nevada	50	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Hampshire	23	T.	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	4	14	3	9	....	....	....	....	....	....	....	....	....	....	....	....	32	6	T.
		A.	....	....	1	2	....	....	....	....	1	....	....	....	....	....	1	....	....	....	....	....	1	....	1	....	1	....	1	....	....	....	....	9	8	A.
New Jersey	51	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	15	1	2	9	11	4	....	1	....	....	....	....	....	....	....	43	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Mexico	37	T.	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	2	....	....	....	....	5	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New York	95	T.	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	33	5	15	5	21	4	....	....	1	....	....	1	....	....	....	86	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	1	A.
North Carolina	60	T.	10	....	....	....	....	....	....	1	....	....	....	....	....	1	2	....	9	3	....	1	16	1	2	32	3	2	....	....	3	7	....	93	15	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Dakota	40	T.	....	....	....	....	....	....	....	....	....	....	7	....	....	....	....	....	1	....	....	....	....	1	4	....	....	5	8	7	....	....	....	33	7	T.
		A.	....	2	6	5	3	1	....	1	1	....	41	2	....	2	1	....	....	....	....	1	7	1	....	1	....	....	....	....	....	....	....	32	13	A.
Ohio	137	T.	3	....	....	1	3	3	....	....	4	1	1	....	....	....	....	1	....	1	1	61	16	....	19	25	....	4	23	12	40	26	....	279	16	T.
		A.	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	11	6	A.
Oklahoma	23	T.	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	2	....	....	....	6	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Oregon	60	T.	....	....	....	....	....	2	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	2	....	....	....	1	....	1	....	10	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Pennsylvania	96	T.	1	....	....	....	....	....	....	....	1	1	4	3	....	....	....	....	17	1	3	20	18	2	....	4	....	....	....	....	1	....	....	76	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Rhode Island	8	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	....	2	....	1	2	....	....	....	....	....	....	....	....	....	9	4	T.
		A.	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	2	2	A.
South Carolina	40	T.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	3	1	13	6	1	....	....	....	1	....	34	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Dakota	44	T.	....	....	....	....	....	....	2	....	1	3	5	2	....	1	1	....	5	1	....	....	2	6	1	....	3	....	3	7	....	1	....	44	17	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	9	3	A.
Tennessee	51	T.	12	1	1	....	....	2	....	....	1	....	....	....	4	1	....	....	....	....	....	1	15	7	5	10	8	15	7	3	15	4	....	112	18	T
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A
Texas	88	T.	2	....	....	....	1	1	2	2	3	....	3	9	4	....	....	....	....	....	....	1	....	1	....	....	....	....	1	1	....	....	....	31	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Utah	38	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Vermont	16	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	2	5	....	....	....	....	....	....	....	....	....	....	....	....	14	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Virginia	43	T.	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	2	1	....	1	5	....	....	9	....	....	....	....	4	1	....	24	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Washington	54	T.	....	....	....	....	....	....	5	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	2	....	....	1	....	....	....	....	9	4	T.
		A.	....	1	1	2	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	4	A.
West Virginia	40	T.	....	....	....	....	....	....	....	....	....	....	6	2	....	....	....	....	....	....	....	....	5	....	1	5	1	....	....	....	3	6	....	29	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Wisconsin	58	T.	7	1	....	....	....	....	1	1	1	5	13	6	15	2	1	9	22	8	8	13	....	2	10	....	4	1	5	29	16	....	....	180	23	T.
		A.	....	....	10	7	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	7	3	2	....	....	....	....	....	....	....	....	....	23	7	A.
Wyoming	12	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Sums	2,799	T.	71	3	1	6	28	23	65	76	50	89	172	73	102	32	9	55	269	75	116	204	160	98	148	186	102	62	89	196	216	85	....	2,961	....	T.
		A.	2	4	57	44	15	2	1	8	5	2	2	2	3	2	2	1	2	0	0	6	39	10	4	3	2	1	0	0	1	2	....	222	....	A.

TABLE XI.—*Hourly sunshine as deduced from sunshine recorders, April, 1896.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Monthly summary.			
		A. M.								P. M.								Instrumental record.			Personal estimate.
		5	6	7	8	9	10	11	Noon	1	2	3	4	5	6	7	8	Actual.	Possible.	Per cent of possible.	
																		Hours.	*Hours.*		
Atlanta, Ga	T.	.....	35	48	76	88	85	92	92	93	91	90	88	85	72	36	.....	311.0	319.6	79	59
Baltimore, Md	T.	.....	28	33	37	47	48	58	57	67	63	63	52	41	28	14	.....	186.2	397.0	47	46
Bismarck, N. Dak	P.	9	27	36	41	42	45	49	49	45	48	51	49	40	37	21	0	170.5	408.4	42	38
Boston, Mass	T.	.....	44	52	54	66	76	80	78	79	74	62	54	47	37	42	.....	245.5	401.1	61	53
Buffalo, N. Y.*	T.	86	40	38	39	44	60	62	68	75	77	59	48	45	33	16	.....	146.0	285.9	51	37
Chicago, Ill	T.	.....	32	40	57	63	69	70	77	78	81	79	78	64	39	31	.....	251.0	401.1	63	54
Cincinnati, Ohio	T.	.....	41	46	59	79	89	91	90	88	91	89	86	83	80	66	.....	311.7	397.0	79	56
Cleveland, Ohio	P.	.....	31	53	56	58	62	57	56	62	68	67	64	54	44	32	.....	227.4	401.1	57	43
Columbus, Ohio	T.	.....	36	36	48	68	74	76	81	87	79	74	69	55	36	24	.....	245.9	398.6	62	45
Denver, Colo	P.	.....	60	71	80	84	87	85	87	82	81	76	74	73	62	38	.....	301.1	398.6	76	56
Des Moines, Iowa	T.	.....	41	48	58	67	70	77	80	77	78	75	71	62	48	41	.....	259.7	401.1	65	39
Detroit, Mich	T.	.....	49	49	55	64	74	78	69	73	70	73	70	58	38	35	.....	248.3	401.1	62	52
Dodge City, Kans	P.	.....	46	54	60	68	78	75	76	75	78	70	70	68	61	56	.....	268.6	396.2	68	60
Eastport, Me	P.	40	43	44	47	56	64	57	55	57	57	61	57	52	52	45	80	218.2	403.2	54	44
Eureka, Cal	P.	...	9	22	30	40	41	44	47	50	50	51	47	39	29	13	.....	152.2	399.4	38	34
Galveston, Tex	P.	.....	12	22	31	50	54	58	55	60	62	54	53	39	23	4	.....	170.6	396.4	44	35
Helena, Mont	P.	26	31	42	50	58	67	63	59	57	58	49	44	51	57	62	71	220.0	408.4	54	52
Kansas City, Mo	P.	.....	34	42	50	54	56	57	55	51	55	61	53	46	43	34	.....	199.1	397.0	50	45
Little Rock, Ark	T.	.....	34	34	43	65	82	90	89	89	87	85	86	78	69	63	.....	285.1	392.7	73	57
Louisville, Ky	T.	.....	47	54	66	81	89	88	95	97	94	94	91	76	71	72	.....	320.9	396.2	81	55
New Orleans, La	T.	.....	39	33	42	56	67	67	64	65	66	69	47	36	13	7	.....	194.1	397.4	50	48
New York, N. Y	T.	.....	28	37	54	61	63	65	65	69	69	68	74	55	40	27	.....	226.7	399.4	57	49
Northfield, Vt	P.	67	48	52	63	61	59	63	59	53	58	54	57	54	38	32	100	218.7	403.6	54	45
Philadelphia, Pa	T.	.....	52	52	51	68	77	82	83	82	84	83	84	77	60	30	.....	282.1	398.6	71	47
Phoenix, Ariz	P.	.....	77	94	97	96	97	96	95	89	91	94	91	88	84	69	.....	356.1	390.5	91	80
Portland, Me	T.	0	13	36	51	71	82	85	79	78	68	66	58	52	38	24	25	237.3	403.6	59	40
Portland, Oreg	T.	0	15	17	16	25	28	36	47	47	44	43	33	34	17	17	0	120.4	407.0	30	37
Do	P.	0	15	17	19	29	31	34	34	38	38	43	39	33	24	18	0	130.9	407.0	30	37
Rochester, N. Y	T.	86	47	48	56	70	77	82	87	80	79	77	75	64	50	48	.....	273.6	402.1	68	55
St. Louis, Mo	T.	.....	39	48	58	69	76	79	91	96	95	86	83	76	59	26	.....	286.5	397.0	72	53
Salt Lake City, Utah	P.	.....	56	50	50	58	66	69	66	57	63	59	57	52	42	34	.....	234.5	399.4	56	38
San Diego, Cal	P.	... ..	75	63	66	74	83	92	95	93	93	96	95	87	80	77	.....	329.1	390.5	84	78
San Francisco, Cal	T.	.....	3	31	51	68	74	80	83	81	77	77	68	65	49	20	.....	243.9	396.2	62	44
Santa Fe, N. Mex	P.	.....	73	83	86	88	90	90	89	88	88	86	86	82	68	60	.....	329.3	393.6	84	68
Savannah, Ga	P.	....	43	53	65	71	76	71	80	81	81	85	87	83	60	43	.....	280.5	389.9	72	59
Vicksburg, Miss	T.	.....	36	30	53	67	77	87	84	88	86	82	71	65	51	37	.....	263.1	389.9	67	67
Washington, D. C	P.	.....	35	42	54	56	59	57	63	64	64	61	60	58	46	42	.....	219.6	397.0	55	50
Wilmington, N. C	T.	.....	56	58	70	88	94	99	95	95	94	97	92	83	60	50	.....	324.1	391.6	83	69

* All values for 21 days.

TABLE XII.—*Maximum rainfall in one hour or less, April, 1896.*

Stations.	Maximum rainfall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		*Inch.*		*Inch.*	
Atlanta, Ga	0.04	1	0.06	1	0.18	1
Bismarck, N. Dak	0.04	11	0.07	11	0.22	11
Boston, Mass	0.15	19	0.16	19	0.34	19
Buffalo, N. Y	0.07	21	0.09	21	0.14	21
Chicago, Ill.†	0.25	20	0.39	20	0.52	20
Cincinnati, Ohio	0.05	30	0.06	30	0.28	30
Cleveland, Ohio	0.40	30	0.60	30	1.54	30
Denver, Colo.	0.01	28	0.02	28	0.11	28
Detroit, Mich	0.12	27	0.20	27	0.46	11
Dodge City, Kans	0.30	16	0.50	16	1.26	16
Duluth, Minn	0.08	28	0.12	28	0.22	28
Eastport, Me	0.01	13	0.02	13	0.07	13
Galveston, Tex	0.06	12	0.10	12	0.37	12
Indianapolis, Ind	0.13	20	0.16	20	0.21	20
Jacksonville, Fla	0.06	25	0.10	25	0.25	25-26
Jupiter, Fla	0.20	9	0.30	9	0.90	9
Kansas City, Mo	0.17	8	0.28	8	0.80	8
Key West, Fla	.....	.....	.....	.....	0.04	6
Little Rock, Ark	0.09	12	0.15	12	0.40	12
Louisville, Ky	0.06	24	0.11	24	0.12	24
Marquette, Mich*	.....	.....	.....	.....	.....	.....
Memphis, Tenn	0.12	1	0.19	1	0.57	1

TABLE XII.—*Maximum rainfall*—Continued.

Stations.	Maximum rainfall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		*Inch.*		*Inch.*	
Milwaukee, Wis	0.40	17	0.48	17	0.68	17
Nantucket, Mass	0.01	28	0.02	28	0.06	28
Nashville, Tenn	0.15	21	0.20	21	0.33	21
New Orleans, La	0.42	9	0.75	9	1.57	9
New York, N. Y	0.03	20	0.06	20	0.22	20-21
Norfolk, Va	0.11	24	0.16	24	0.28	24
Omaha, Nebr	0.10	28	0.17	28	0.45	12
Philadelphia, Pa	0.05	20	0.09	20	0.24	20-21
Pittsburg, Pa.*	.....	.....	.....	.....	.....	.....
Portland, Me	0.03	22	0.05	22	0.12	22
Portland, Oreg	0.09	8	0.18	8	0.21	8
Rochester, N. Y	0.14	21	0.16	21	0.23	21
St. Louis, Mo	0.14	29	0.24	29	0.80	29
St. Paul, Minn	0.14	11	0.18	11	0.35	11
Salt Lake City, Utah	0.02	14	0.05	14	0.14	14
San Diego, Cal.††	.....	.....	.....	.....	.....	.....
San Francisco, Cal	0.07	24	0.13	24	0.31	24
Savannah, Ga	0.30	24	0.46	24	1.02	24
Seattle, Wash	0.03	6	0.05	6	0.17	6
Vicksburg, Miss	0.31	13	0.47	13	1.07	13
Washington, D. C	0.06	24	0.10	24	0.13	24
Wilmington, N. C	0.05	24	0.10	24	0.15	24

* Record incomplete on account of snow or other causes. † Partly estimated. †† Less than 0.05 inch in one hour.

TABLE XIII.—*Excessive precipitation, by stations, for April, 1896.*

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Carrolton		3.46	13-14			
Demopolis		3.05	13-14			
Do		2.90	29-30			
Livingston		2.62	13-14			
Maplegrove				1.05	1 00	22
Newbern		2.65	29			
Pushmataha		7.40	13-14			
Scottsboro		2.86	1			
Arkansas.						
Beebranch		2.55	12-13			
Blanchard Springs		6.00	12-13			
Camden *b*		4.53	12-13			
Elon		3.05	12-13			
Forrest		3.70	*			
Do		3.20	12-13			
Helena *a*		2.74	13			
Keesees Ferry				1.16	0 37	22
Latour		2.79	13			
Lonoke		3.63	12-13			
Madding		3.12	12-13			
Marvell		2.70	13			
New Gascony		2.82	12-13			
Pinebluff		3.31	12-13			
Pocohontas		3.45	29			
Stuttgart		2.64	9-10			
Warren		4.69	12-13			
California.						
Bear Valley	18.32	3.07	6			
Bowmans Dam	18.45	2.64	24			
Do		3.26	25-26			
Cape Mendocino, L. H	11.25					
Crescent City	12.50					
Davisville		3.42	24			
Delta	16.72					
Edmanton	16.25					
Eureka	11.13	2.87	12-13			
Fordyce Dam	15.07					
Georgetown	16.51	3.75	5-6			
Do		2.51	25			
Grass Valley	12.47	3.68	24			
Greenville	11.05	3.33	24			
Humboldt, L. H	10.96					
Hydesville	11.26	2.67	13			
Iowa Hill	14.01	2.64	5-6			
Jackson	10.89					
Kennedy Gold Mine	11.20	4.51	5-6			
Laporte	16.63	3.82	24			
Malakoff Mine	17.78	4.41	5-6			
Do		4.71	24			
Middletown		2.83	22-23			
Milton (near)		2.87	23-24			
Mokelumne Hill	10.06	3.55	6			
Do		3.43	23-24			
Mountain Home	11.01					
Mount Glenwood		4.26	24			
Napa		2.59	24			
Nevada City	13.63	3.30	6			
Do		2.65	24			
Oleta		2.75	24			
Oroville		3.04	24			
Palermo		3.05	24			
Pilot Creek	16.67	3.06	6			
Do		4.11	24			
Placerville	12.00	2.68	6			
Do		2.92	24			
Quincy	11.03	3.34	24			
San Rafael	10.00	3.65	6			
Do		4.39	25			
Shasta	12.27	3.22	25			
Shasta Springs		3.75	22-23			
Summerdale		3.02	24			
Trinidad L. H	11.52					
Upper Mattole	17.02	2.63	23-24			
Vacaville		3.12	23			
Westpoint	13.04	2.97	24			
Wheatland		2.76	24			
Wire Bridge		3.19	6			
Yuba City		2.90	24			
Colorado.						
Santa Clara		4.20	11			
Seibert		2.50	28			
Stamford		5.20	11-12			
Wray		3.38	28			
Georgia.						
Augusta				1.15	0 26	24
Covington				1.33	1 15	24
Savannah				1.02	1 00	24
Illinois.						
Herrins Prairie				1.00	1 00	29
Indiana.						
Angola		2.72	20			
Indian Territory.						
Eufaula		2.80	19			
Lehigh				1.26	1 00	8
Iowa.						
Alta		2.85	7-8			
Carroll				2.14	1.30	20
Cedar Rapids		3.30	7-8			
Dows				2.00	1 00	28
Dubuque		2.60	28	1.80	1 00	28

TABLE XIII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Iowa—Cont'd.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Independence				1.50	0 42	28
Iowa Falls		2.78	7-8			
Kansas.						
Burlington		3.20	7-8			
Colby				1.92	1 45	17
Dodge City		2.91	11-12	1.26	1 00	16
Downs		4.90	11-12			
Dresden		2.86	11-12			
Emporia		2.75	7-8			
Grainfield		4.05	11-12			
Greensburg		3.38	11-12			
Ness City		3.04	11-12			
Norton		3.20	11-12			
Oberlin		2.65	11-12			
Paola		3.05	5-6			
Phillipsburg		2.51	12			
Russell		3.65	11-12	2.23	1 15	24
Kentucky.						
Caddo				1.30	1 00	26
Marrowbone				1.36	0 20	23
Sandyhook		3.05	3			
Louisiana.						
Abbeville		3.10	13-14			
Alexandria		2.80	14			
Cheneyville		3.00	14			
Coushatta		6.06	12-13			
Donaldsonville		2.65	14			
Emilie		3.75	14			
Farmerville		5.00	12-13			
Jeanerette		7.75	13-14			
Liberty Hill		6.05	12-13			
Maurepas		2.50	14			
New Iberia		7.90	14			
New Orleans				1.57	1 00	9
Do				1.11	1 00	14
Oxford		6.58	12-13			
Paincourtville		2.70	13			
Shreveport		3.63	12-13			
Sugartown		3.22	13			
Wallace		3.16	14			
White Sulphur Springs		2.70	13			
Minnesota.						
Camden	11.93	4.39	25-26			
Dawson		3.50	11			
Montevideo				2.00	1 00	25
Mount Iron		2.70	12			
New London	10.30					
Saint Charles		2.68	28			
Mississippi.						
Briers		4.32	13			
Brookhaven		3.79	13			
Crystal Springs		3.53	13			
Enterprise		3.68	13			
Fayette		4.85	13-14			
Jackson		2.64	13-14			
Magnolia		3.36	13-14			
Meridian		3.21	13-14			
Mico		5.42	13-14			
Natchez		4.50	13			
Poplarville		3.01	29	3.01	2 00	29
Topton		3.15	13-14			
Vicksburg				1.07	1 00	18
Williamsburg	10.64	8.60	13			
Woodville		7.21	13-14			
Missouri.						
Athens		2.60	22			
Shelbina		3.00	12			
Nebraska.						
Albion		3.03	12			
Arborville	10.06	4.68	11-12			
Ashton		2.68	11-12			
Beaver City		2.77	11-12			
Bluehill		3.60	10-11			
Callaway		3.00	16-17			
Columbus		2.76	12			
Creighton		2.80	12			
Curtis		3.35	16-17			
David City	10.25	4.90	11-12			
Dunning		2.70	12			
Edgar		3.57	11-12			
Elba		4.22	11-12			
Ericson		2.75	11-12			
Ewing		3.42	11-12			
Do		2.95	29			
Fairmont		4.00	11-12			
Franklin		4.81	11-12			
Genoa		2.73	11-12			
Gibbon		3.47	12			
Gothenburg		3.65	17			
Grand Island		3.99	11-12			
Harvard		5.05	11-12			
Hastings		2.70	12			
Holdrege		3.10	12			
Imperial		2.60	28			
Loup		3.12	12	1.00	0 25	17
Lyons		3.00	28			
McCool		4.29	12			
Madrid		2.98	28			
Marquette		3.12	12			
Minden	10.82	5.32	11-12			

TABLE XIII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Nebraska—Cont'd.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Norman		4.31	11-12			
Oakdale		2.61	11-12			
Osceola		4.10	12			
Palmer		3.25	11-12			
Ravenna		3.42	11-12			
Redcloud		2.59	11-12			
Republican		4.25	11-12			
Saint Paul		2.64	11			
Schuyler		3.55	12			
Seneca		2.75	28			
Spencer		3.35	29			
Strang		3.00	11-12			
Stromsburg		4.39	11-12			
Superior		4.30	11-12			
Sutton		5.25	11-12			
Thedford		2.80	28			
Woodlawn		2.79	28			
York	11.22	5.00	11-12			
New Mexico.						
Clayton		2.50	11-12			
New York.						
Romulus				1.30	0 45	21
Wedgwood				2.03	2 00	17
North Carolina.						
Jacksonville				1.89	1 30	13
Linville		3.50	1			
North Dakota.						
Milton		2.50	29			
Sheyenne		3.00	28			
Woodbridge		3.15	27			
Ohio.						
Cleveland				1.54	1 00	30
Elyria		2.90	20			
Leipsic		2.66	20			
Montpelier		2.58	20	2.34	1 00	29
New Berlin		2.68	20			
Wauseon		3.04	20			
Oregon.						
Bandon		2.77	12			
Gardiner	14.70	4.95	12			

TABLE XIII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Oregon—Cont'd.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Glenora	13.60					
Langlois	18.37	2.90	9			
Do		2.50	29			
Nehalem	15.23	3.45	11			
Newport	12.95	3.50	12			
Salmon	13.29	2.94	13			
South Carolina.						
Holland				1.00	1 00	1
South Dakota.						
Gary		2.50	11-12			
Hitchcock		3.10	17			
Shiloh		3.20	28-29			
Tennessee.						
Decatur		4.30	*			
Greenville		3.06	*			
Jackson				1.07	1 00	21
Johnsonville		2.80	*			
Knoxville		3.19	*			
Newport		3.25	*			
Nunnelly		2.54	25-26			
Sewanee		2.57	*			
Springdale		2.50	*			
Strawberry Plains		3.40	*			
Texas.						
Austin		3.10	5			
Colmesneil		2.92	12			
Duvall		2.67	6			
Fredericksburg		3.45	5-6			
Kerrville		3.65	5-6			
Orange				2.00	1 00	14
Wisconsin.						
Greenbay		2.54	28-29			
Lincoln		2.80	28			
Manitowoc		4.00	28-29			
Oconto		2.65	28			
Shawano		2.74	28-29			

*March 31 to April 1.

Chart I. Tracks of Centers of Low Areas. April, 1896.

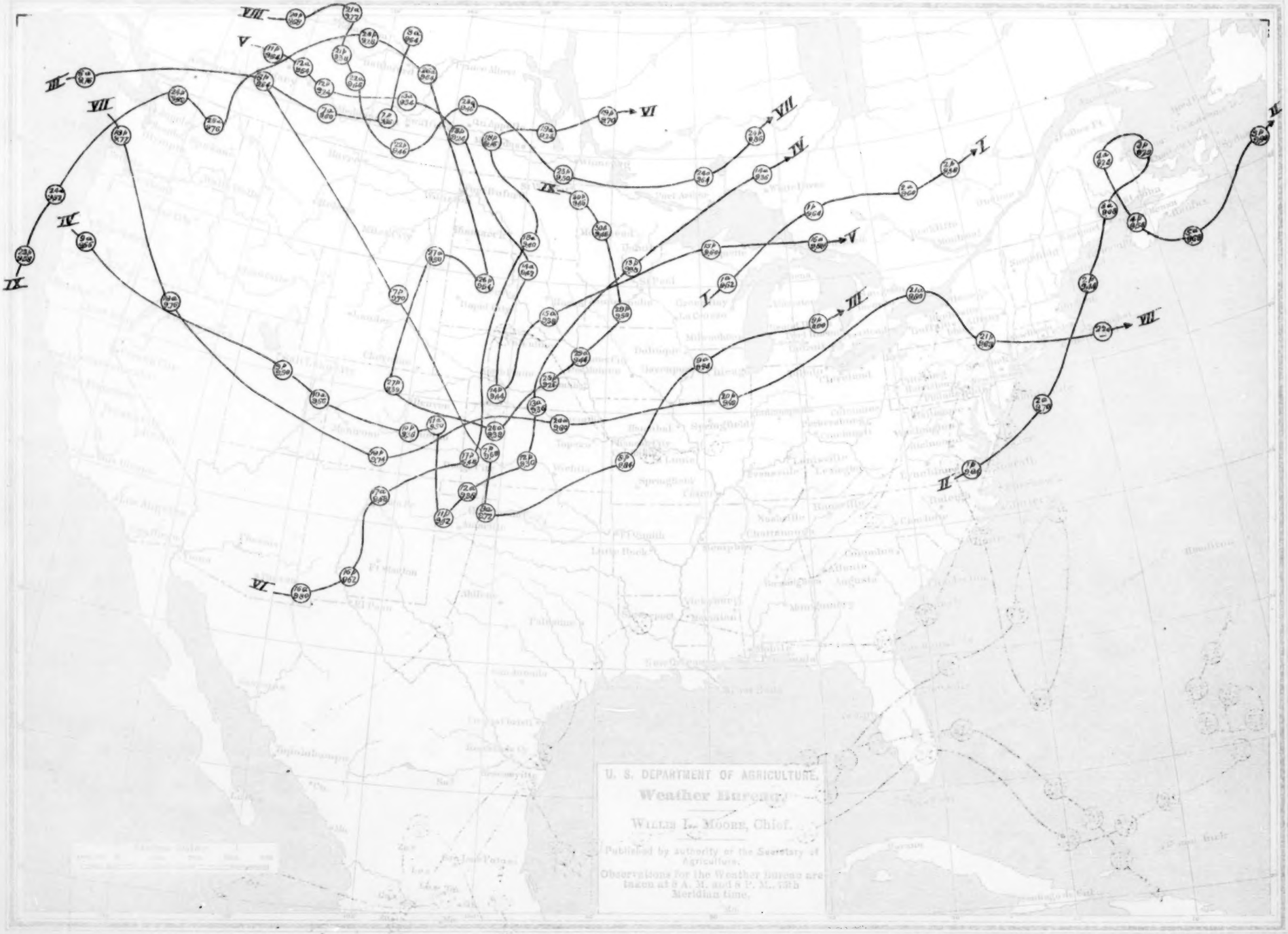
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Chart II. Tracks of Centers of High Areas. April, 1896.

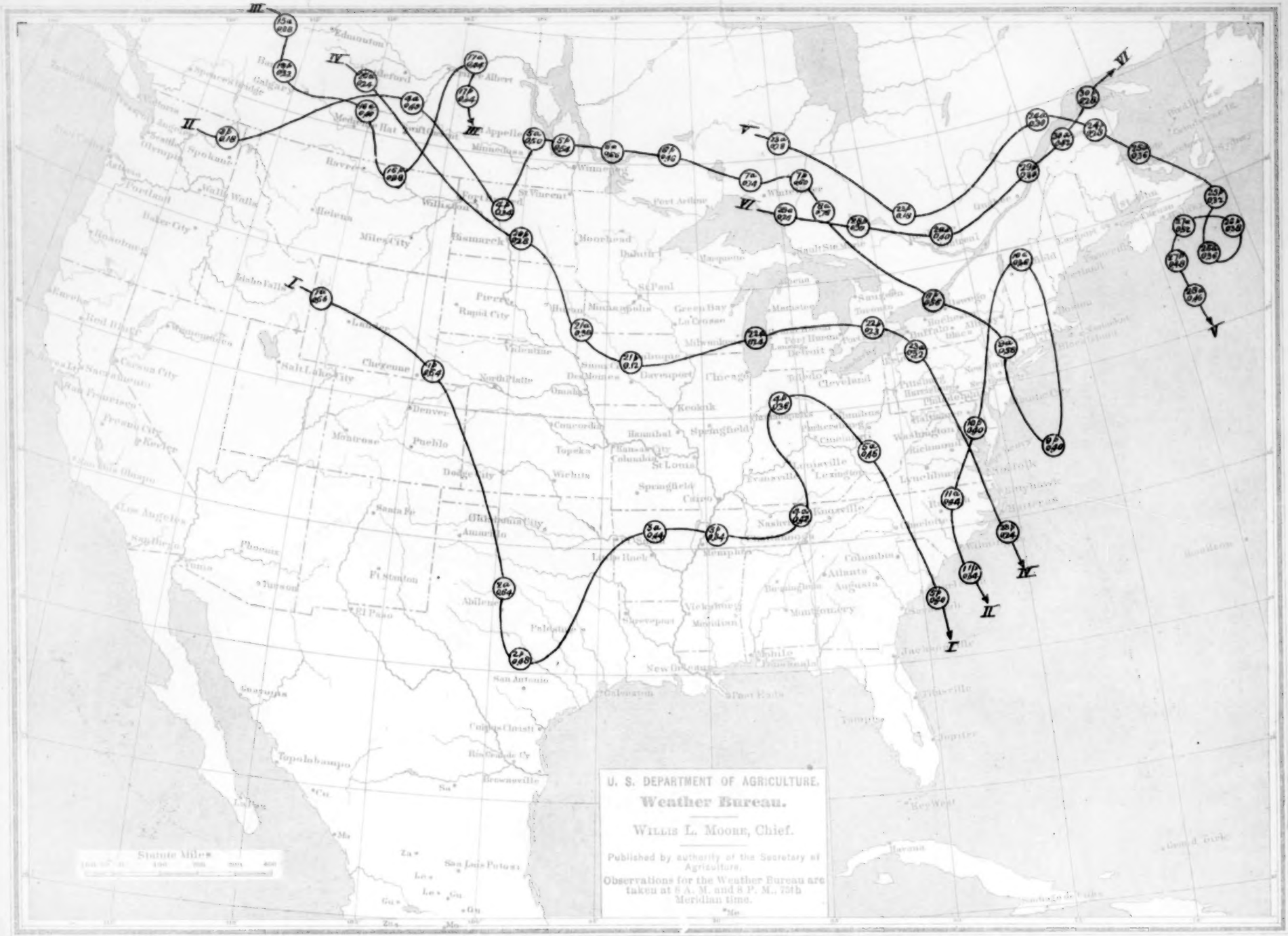
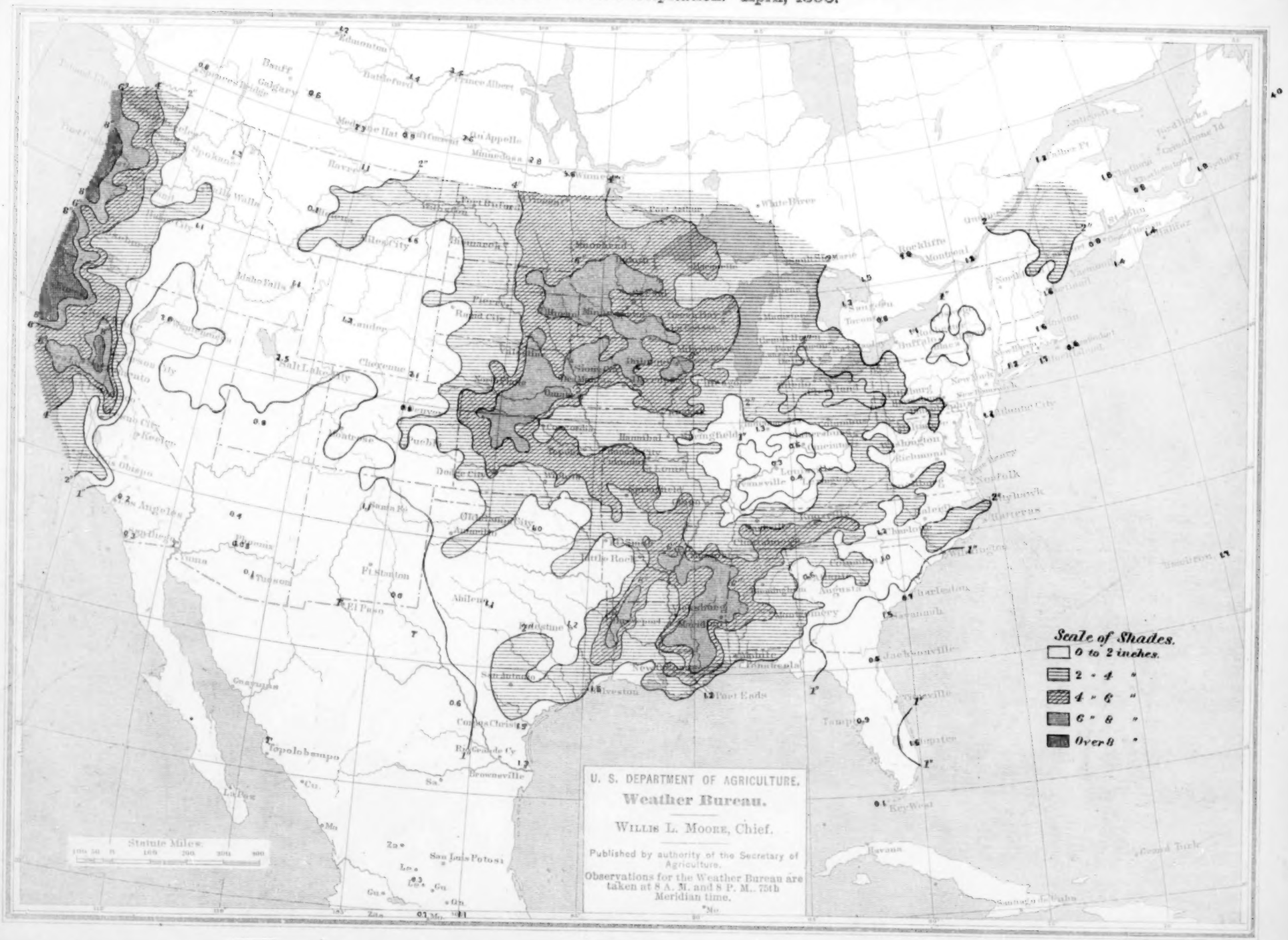


Chart III. Total Precipitation. April, 1896.


Scale of Shades.
0 to 2 inches.
2 - 4 "
4 - 6 "
6 - 8 "
Over 8 "
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Statute Miles.

Chart IV. Isobars, Isotherms, and Resultant Winds. April, 1896.

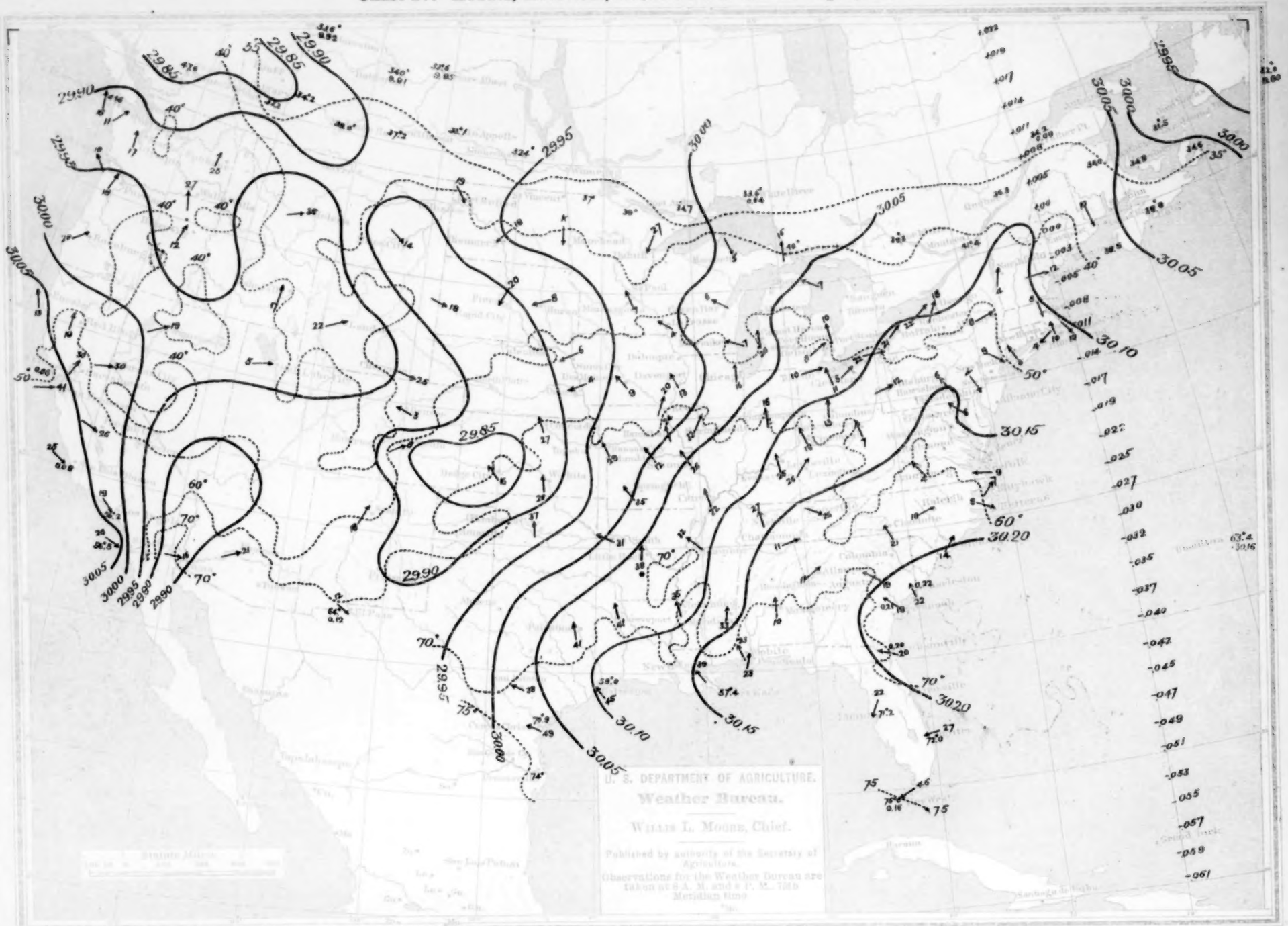
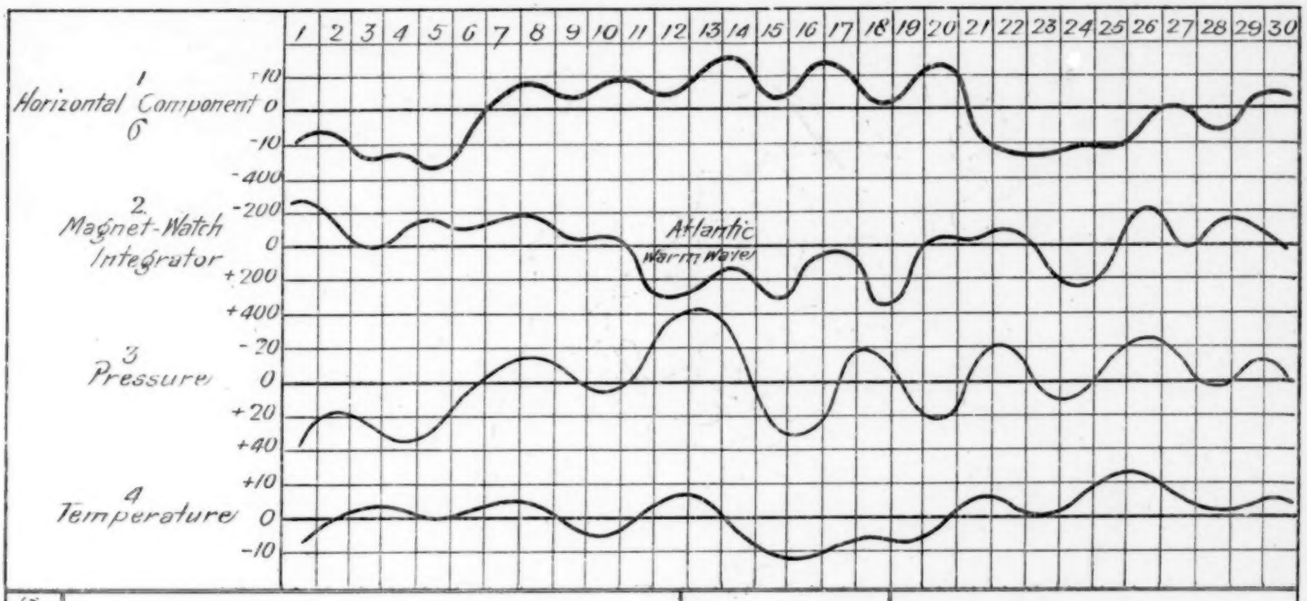


Chart V. Relative Variations of the Horizontal Magnetic Force, the Magnet-Watch Integrator, and the Northwest Pressures and Temperatures. April, 1896.



April 1896	Washington and Toronto Deflecting Magnetic Forces.						Weather Bureau Magnet Watch		Northwest			
									Pressure		Temperature	
	H	D	dx	dy	σ	β	Noon	Δt	P	ΔP	T	ΔT
1	65	4.0	-7	-1	-7	188	h. m. s. 11.40.30	-279	30.37	+38	26	-5
2	67	4.9	-5	+4	-6	141	38.7	-127	30.18	+19	32	+1
3	58	5.0	-13	+4	-14	163	38.5	-2	30.21	+22	32	0
4	59	4.8	-12	+3	-12	166	36.66	-69	30.32	+33	35	+3
5	55	3.9	-16	-2	-16	187	34.26	-150	30.26	+26	33	0
6	65	4.6	-5	+2	-5	158	32.2	-144	30.05	+5	37	+4
7	71	5.0	+1	+4	+4	78	29.16	-166	29.94	-6	36	+3
8	77	4.6	+8	+1	+8	7	26.4	-192	29.86	-15	39	+5
9	69	3.8	0	-3	+3	270	24.46	-78	29.96	-4	33	-1
10	75	3.5	+6	-5	+8	320	23.45	-61	30.02	+3	31	-4
11	71	3.3	+3	-6	+7	296	24.51	+66	29.88	-10	35	0
12	73	4.6	+5	0	+5	0	30.1	+310	29.57	-40	40	+4
13	80	5.1	+13	+3	+13	13	34.11	+250	29.50	-46	39	+3
14	80	4.3	+13	-2	+13	352	36.30	+149	29.76	-19	32	-5
15	71	4.8	+4	+1	+4	14	40.58	+268	30.19	+25	26	-11
16	78	4.9	+12	+1	+12	5	41.57	+59	30.21	+28	26	-12
17	76	4.6	+10	-1	+10	352	42.28	+31	29.94	+2	29	-9
18	67	4.4	+1	-2	+2	294	48.12	+344	29.74	-17	32	-7
19	73	5.1	+8	+1	+8	8	49.26	+74	29.95	+5	33	-7
20	76	5.0	+11	+1	+11	5	48.16	-70	30.10	+22	38	-3
21	62	6.2	-3	+7	-8	113	47.15	-51	29.81	-6	46	+5
22	52	5.4	-12	+2	-12	170	45.40	-105	29.63	-22	44	+2
23	51	5.3	-13	+2	-13	172	46.59	+79	29.94	+10	42	0
24	53	6.0	-10	+5	-11	153	50.41	+222	29.88	+5	49	+6
25	51	5.0	-12	-1	-12	185	52.19	+98	29.71	-11	54	+10
26	59	4.6	-4	-3	-5	218	48.36	-233	29.60	-21	56	+12
27	62	5.2	0	0	0	0	48.51	+15	29.72	-8	49	+4
28	56	4.9	-6	-2	-6	199	45.47	-184	29.80	+1	47	+2
29	62	4.9	+1	-2	+2	296	44.10	-97	29.71	-7	48	+2
30	64	4.7	+3	-3	+4	315	44.4	-6	29.71	-6	52	+5

Chart VI. Depth of Snowfall and Limits of Freezing Weather. April, 1896.

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WILLIS L. MOORE, Chief.
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Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.
Statute Miles

Chart VII. Depth of Snow Lying on Ground April 30, 1896.

U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.
Statute Miles

Chart VIII. Kite Experiments at the Weather Bureau.

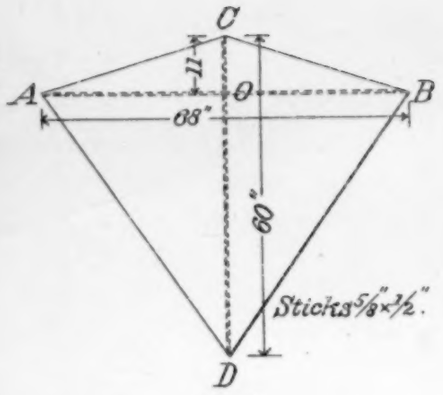

Fig. 1.

Fig. 2.

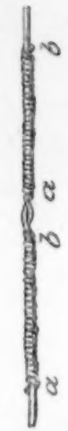

Fig. 4.

Fig. 5.

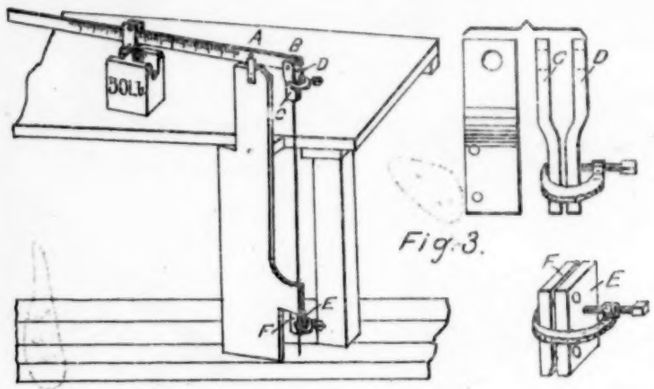

Fig. 3.

Fig. 7.

Fig. 6.

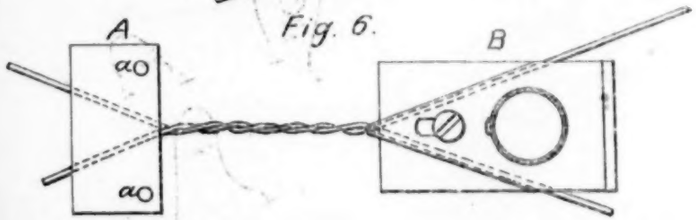

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

Fig. 16.

Chart IX. Kite Experiments of the Weather Bureau.

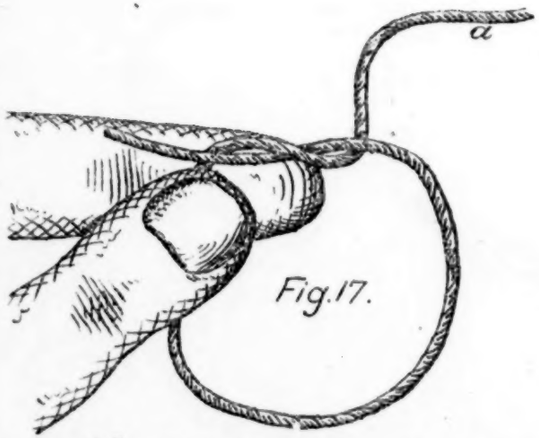

Fig. 17.

Fig. 18.

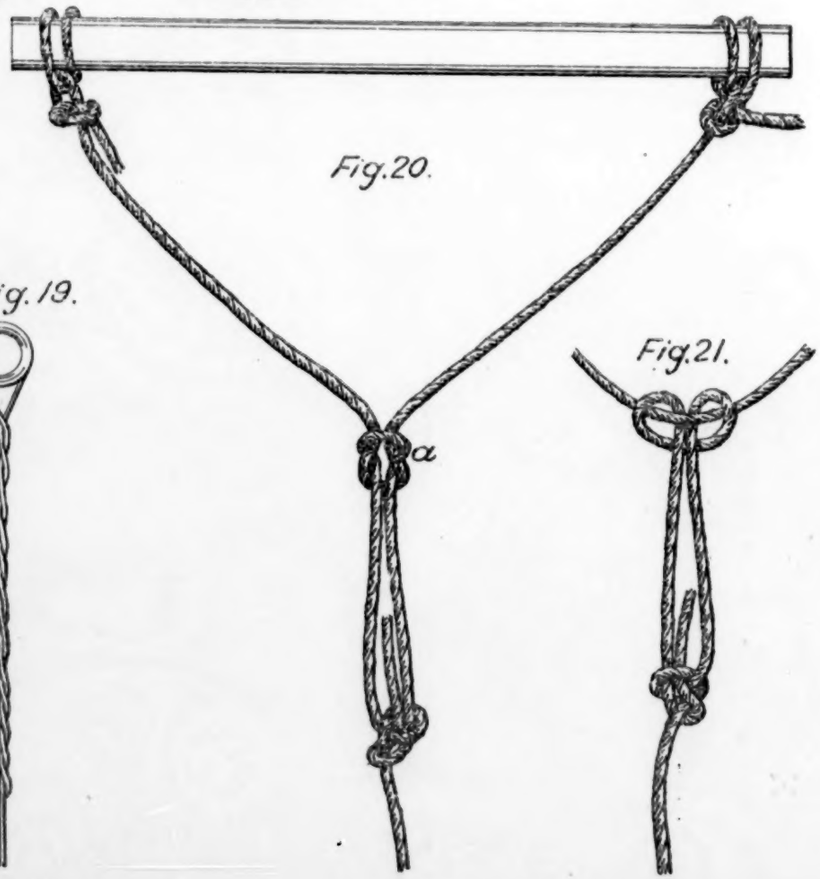

Fig. 20.

Fig. 19.

Fig. 21.

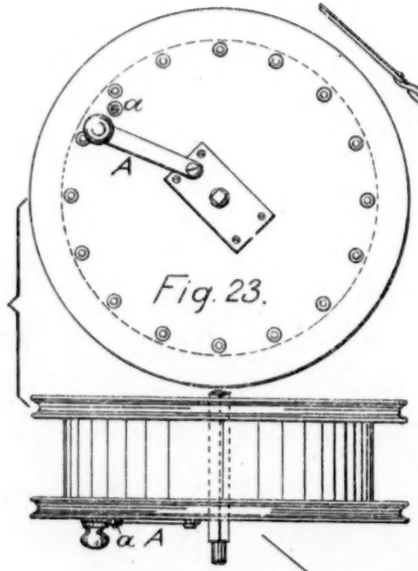

Fig. 23.

Fig. 22.

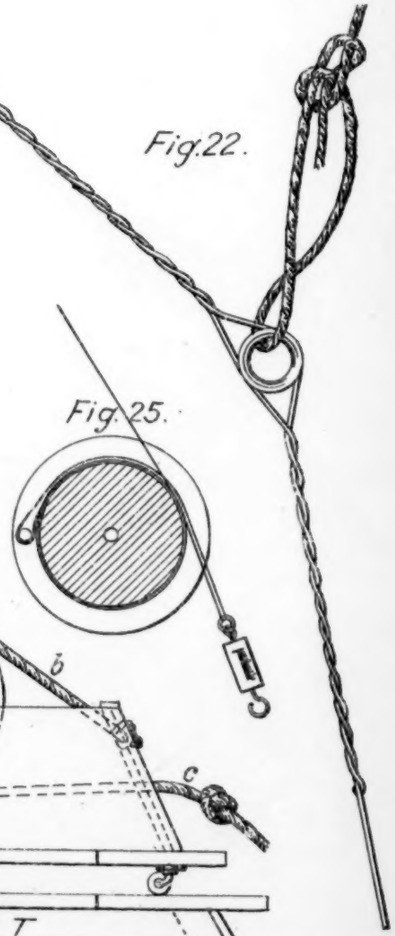

Fig. 25.

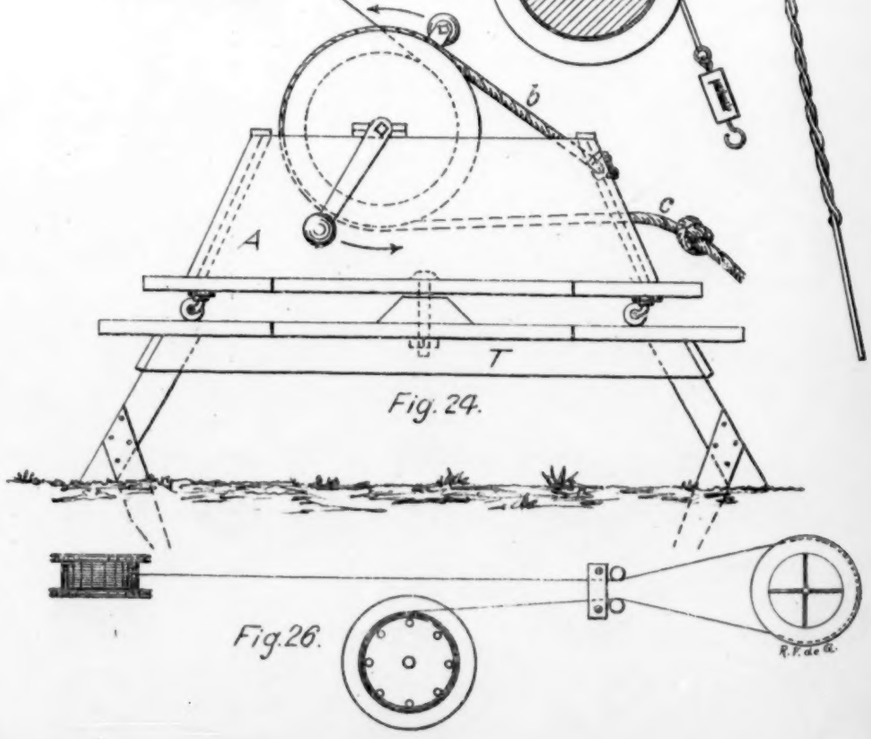

Fig. 24.

Fig. 26.